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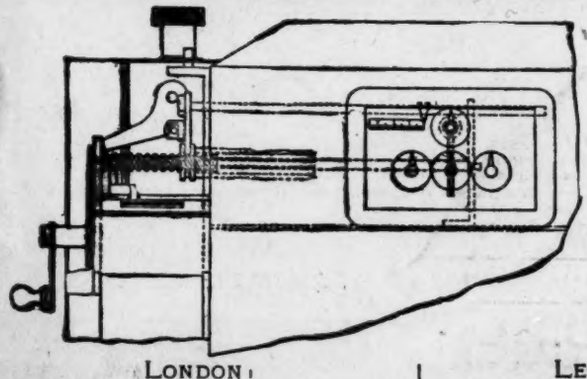

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EDITORIAL NOTES.

Priority in, and Prices of, Coal Supplies.

IT cannot be said that the District Coal and Coke Supplies Committees, with the Central Committee sitting in direct communication with the Board of Trade, have been of any considerable assistance to gas undertakings of the country, though the Committees are supposed to have collected data, and kept themselves in touch with the available supplies of fuel and their dispensation. The fact of the matter is that the coal interests are too well represented on these Committees; and so it happens that the most notable result of the working of, at any rate, the Central Committee appears to have been the highly sapient suggestion as to the reduction by 10 per cent. of the coal used for lighting, with the view to giving the coalowners more coal to export to neutral countries, at prices only limited by the last coin that the foreign buyers will pay, and for the purpose of carrying on trading negotiations with certain countries, as though coal was the only thing that those other countries require from this one. These are not the reasons that the Board of Trade advance for the ineffectual—at any rate so far as gas undertakings generally are concerned—operations of the District Committees. The Board admit that, in carrying on the work of the Committees, "occasional" difficulty has arisen; and they attribute this to the fact that any direction from the Committees does not in itself give any legal authority for the suspension of a contract in order to afford supplies to concerns engaged on important work for the country. The power that the Committees do not hold is possessed by the Admiralty and Army Council under the Defence of the Realm Act; so that an order from them would relieve of liability for default any contractor who has to divert coal in the national interest.

However, there has been disappointment over the sparseness of the beneficial outcome of the labours of the District Coal and Coke Supplies Committees. During their existence, countenances up and down the country have become more and more rueful over dwindling coal stocks at works upon which the country depend for maintaining the war supplies of our Army and Navy, and to a considerable extent of our Allies. There are many gas-works to-day the stocks of coal at which are much below those held in peace times at this season of the year; and the prospects are somewhat melancholy ones of being able to raise them to normal, let alone to increase them beyond normal, in view of the bad delivery outlook during the coming months, and especially next winter. It was about time the Admiralty, the Army Council, and the Ministry of Munitions—being those chiefly interested—intervened in the matter. They (or persons authorized by them) have now power to effectually move; and the producers of materials for explosives may, among others, count upon the sympathy and the assistance of the powerful departmental trio. By an Order in Council, any one of these departments, after consultation with the Board of Trade (presumably to secure uniformity of action), may issue directions as to the priority to be given in the execution of orders or contracts for the supply of coal or coke, with a view to securing precedence for orders or contracts in accordance with their national importance. This is only an extension of previous regulations, which give priority in respect of other supplies or service—including plant and the repair of plant—to works engaged in the production of munitions of war. Under the new Order, any owner, agent, or manager of any mine who attempts to evade the directions given to him, or anyone who tries, by false statement or representation, to secure any undue advantage in the matter of priority, will, if detected, find himself in an uncomfortable position.

However, with the new Order, the outlook is more promising, for the Explosives Supplies Department of the Ministry of Munitions will naturally see to it, on representations being made to them, that those working in the interests of the nation in the provision of explosives shall not have their productive position jeopardized through coal shortage. This is where those gas-works that are increasing the supply of benzol and toluol by oil or tar washing of gas will have priority in the matter of coal supply over those works that are not doing anything of the kind. There may be in certain quarters, when the pinch comes over the supplies of coal next winter, some deep-felt regret that the washing of gas by oil or tar was not put into practice when urgent appeals were made some time ago for this to be done. Certain it is that the gas undertakings which, early and freely, helped the country in the days of its extremity deserve well of those in high authority.

The issue of the new Order in Council coincided with a deputation of representatives of the gas and electricity industries to Mr. Marwood and Mr. Carlill, of the Board of Trade, to lay before them information concerning the various difficulties which are at the present time being encountered by the two industries in relation to coal supplies—more especially in regard to the fixing-up of new contracts, both in respect of quantities and price. Notwithstanding the admitted impotence of the District Coal and Coke Supplies Committees to effectually render relief in the matter of deliveries, the Board are still hoping that the Committees will have a useful existence, and that representations will be made through them. Now that the power of the Admiralty, the War Council, and the Ministry of Munitions has been brought to bear, the Committees may have a more useful existence as executive bodies and information collecting agencies; but, at the same time, there would be greater confidence if the representation of the coal interests on the District Committees was diluted with representatives of other interests. The question of contracts and prices is one of supreme importance. At every turn, some undertakings are meeting with difficulties in getting contracts settled; and there are coalowners who are displaying superb skill in ordering matters so that the revenue per ton of coal shall rise superior to the limitations of the Coal Price Act. In fine, the desire on the part of a purchaser to make a contract is subject to the willingness of the sellers of coal to enter into a contract at the particular time. The difficulty is a really serious one. Mr. Marwood told the deputation that if any undertaking that had cause to complain of the prices proposed to be charged for new contracts would bring the matter before the Board, they would be prepared to take steps, if necessary, so that the price should be justified by the provision in the Act. There is a difficulty. Specific instances of attempted evasion of the Act are, of course, required; but some fear exists that informers would probably have to suffer reprisals in respect of deliveries, at the hands of those who had attempted to evade the Act in respect of price.

Changed Conditions and Profit Appropriations.

THE Manchester Corporation Gas Committee have loyally complied with the oppressive resolution passed by the City Council, on Jan. 22, 1913, that the Gas Department—in continuation of the old principle of heavy profit appropriation in aid of the rates—should contribute to the City Fund £50,000 per annum for three years. This period will expire on March 31 next. When the resolution was passed by the Council, the times were comparatively normal. There was then no thought of war—no thought of such a catastrophe as a European conflict in which several nations would be involved, with dislocation of the whole world's affairs; no thought of the heavy financial burdens that would weigh upon gas consumers with equal severity as upon those who are not consumers. The war came; its burdens have been felt, and will be felt in greater or less degree for very many years. But the 115,121 ordinary gas consumers, and the

74,506 prepayment consumers in and about Manchester, have, under the fiat of a majority of the City Council, had to bear not only their ordinary and abnormal financial obligations, but have had to find the £50,000 a year in addition, which sum ought to have been borne by the whole of the ratepayers according to rateable value, and not levied upon a section of them under the crude indefensible system that "the more gas you individually burn, the greater shall be "your contribution to the City Fund."

The Manchester Gas Committee have now passed a resolution submitting that, "having regard to the totally "changed conditions due to the war, and to the consequent "financial burdens, including income-tax, . . . it is im-"perative that the Council should at once review the whole "question of rate-aid by the Committee." This is an important resolution—important not only for the gas consumers of Manchester and the out-townships, but also for the gas consumers in many other municipal areas where profit appropriation in aid of the rates is practised. What Manchester does under the changed circumstances of these times will undoubtedly have a powerful influence on policy in this respect elsewhere; and, therefore, upon Alderman William Kay and his colleagues, standing in this matter in the position of leaders, rests very large responsibility. Gas profit appropriation in aid of the rates has always been an injustice, which the present war conditions accentuate.

It is no use local authorities who practise, and attempt to defend, this iniquitous proceeding, pretending that the new conditions that have been created by the war are only ephemeral. It is certain that they will continue in greater or less degree for many years yet. What is uncertain is how much heavier these conditions are to become before we reach their maximum influence on enterprises such as gas concerns. Everything a gas undertaking has to purchase—from coal to gas-mantles, from heavy plant to gas-burners—is far more costly to-day, and will continue to be dearer than before the war for a long period after it. The cost of transmission and handling materials and goods is, and will continue to be, much heavier. The demand that there will be for labour after the war, and the consolidation of certain influential trade unions, will have substantial influence in all directions upon the costs of a gas undertaking. Rates and taxes (which last year amounted to £67,097 in the case of the Manchester undertaking) will also have to bear their proportion of the additions created by the war. At the same time, residuals are uncertain factors in the post-war situation. Coke will then only realize good prices so long as the demand for coal is great and supply limited; and sulphate of ammonia, in view of the competition of the synthetic products, is doubtful as a revenue producer on even the pre-war plane. On the whole, we cannot anticipate that benzol and other commodities now extracted from gas, or the increase in the consumption of gas for domestic and industrial heating (though advance in these directions depends largely upon the ability of gas undertakings to supply gas at a cheap rate) will act as any great off-set to the higher expenses. As a matter of fact, the after-war position of gas consumption in a city like Manchester is somewhat difficult to prognosticate. There is sure to be an increase upon pre-war consumption in the industrial heating business; but, *per contra*, when munition work ceases, there will be the loss of demand now current for the purpose. Including it, there was a reduction of 3·08 per cent. in the quantity of gas sold last year, compared with the previous one. Then there is the Summer Time Act. It is estimated that in Manchester this will (apart from the lighting restrictions) cause a loss in sales for lighting of about 100 million cubic feet by the time the clock is set back an hour at the end of September; and the happy experience this year with the importing of an extra hour of daylight into the active part of the day is most likely to lead to its continuance in future.

Not only on account of the considerations set forth here, but financial results of the trading under present circumstances do not warrant the continuation of the contribution from the Gas Department in aid of the rates. There is not, in fact, a sufficient amount of profits available for the purpose, notwithstanding the extra 6d. per 1000 cubic feet that is being charged to the consumers, compared with 1914-15. The net profit for the past year amounts to £141,235. The year, owing to profit appropriation, started with a deficit of £52,708; £63,163 is required for sinking fund for the redemption of loan debt; and £9373 has been applied in extension of works where borrowing powers were not conferred. On now handing over £50,000 to the City Fund, the undertaking begins a year that will be worse in regard to expenses and working conditions than any that has preceded it, with an adverse balance of £34,009. This is very unfair, and is not creditable to the Manchester City Council. All that is being done in the cause of profit appropriation in aid of the rates is an attack on both the financial stability of the concern and its power for rendering the maximum beneficial service to the city. On the ground of extraordinary conditions alone, the undertaking deserves immediate relief from the burden; on grounds of its past record and competition, it is entitled to permanent relief, quite apart from all questions of principle and equity.

As to past record, the financial and working statistics the Superintendent (Mr. Fred. A. Price) annually prepares show the remarkable success that has attended the concern under the administration of the Gas Committee and the technical guidance of Mr. J. G. Newbigging and his predecessors. The Department has met all its capital charges, has provided for the redemption of capital, and the maintenance and renewal of works, plant, and appliances, has paid rates and taxes to the full—in short, has done financially everything that a sound commercial enterprise ought to do. But on top of all this comes the tremendous weight of compulsorily provided profit to aid the rates. From Mr. Price's statistics, we gather that, since the works were taken over by the Corporation, the total amount applied in lieu, or in aid, of the city rates, is £3,267,174; while the total cost of land, buildings, and plant amounts to £3,083,627. The first-named item—the aggregate of the withdrawals from the pockets of the gas consumers in excess of their individual proportion of the rates—is therefore greater than the total of the capital employed in the undertaking. On every ground, therefore, not excluding that of the advantages of cheap gas in promoting the industries of the city, and the health and the convenience of the citizens, there is a case that is unassailable—save by those ineffectual antiquated missiles employed by the profit appropriators—for the relief that Alderman Kay and his colleagues now claim. We hope for their success—and not only in the interests of Manchester gas consumers; for such success would, we believe, set moving a revision of policy in this respect in many other important industrial areas.

"Traders."

THROUGH the undercurrents of talk, more is again being heard just now in the gas industry of those individuals whom some people call "traders," without stopping to inquire whether there is not good title to some broader designation covering other qualifications and accomplishments. Those people who use the term are generally themselves traders, though they choose to describe themselves otherwise, and to be so known. It may be accepted as a fact that there is no one in receipt of an income, no matter its degree, who has not to thank trade for being its actual source. Yet some shallow-minded people employ the term "traders" with an emphasis implying that those to whom they apply it are richly deserving of some sort of opprobrium, or are individuals who ought to be everlastingly thankful that other people condescend to trade with them, albeit it may be to the convenience and profit of those people to do so. Persons who speak and act as though there is some degradation in trade simply clothe themselves with a superiority which is often ludicrously ill-fitting, and which makes more commonsense people smile. Directly or indirectly all the adult units of the community are traders; and it is something over which to be gratified that the make-believe which used to exist is not so broadcast to-day as it was once. There were at one time many people who, under the influence of absurd ideas as to trading being *infra dig.*, would not for much have had it known that they were concerned in trade on the sales side—indirectly it may be through their capital provision for business purposes, and glad enough they were of the earnings of that capital. But those same people to-day come out into the open markets, and lend not only their capital, but names, brains, and presence to commerce. We are growing more enlightened. Even our political masters are openly recognizing that industry and trade are of the very foundation of our prosperity; and the greatest interest to-day, next to the fearful sanguinary contest, is concentrated on the question of how after the war to expand that prosperity. Through whom?—the "trader."

We never could quite understand how the engineering and manufacturing firms of the gas industry—firms working diligently not only for themselves, but in and for the gas industry—come under such a very narrow appellation as "traders," as though trading constituted the sole qualifications and occupations of those at the head of the firms without whom the gas industry would not have achieved the progress that it has done. Others may have some superlative power of discrimination, but we see no distinction between those firms and most other people who take part in the work and fortunes of the industry. Fortunately, it is only in certain quarters of the gas-supply industry that there exist the extraordinary notion and discrimination regarding those classified as "traders." To be logical, the discrimination should be carried further, and the right be denied to gas undertakings to call themselves "traders." Trading is the road prior to, and succeeding, gas manufacture along which every gas undertaking hopes to attain the objective of a financial success. The gas undertaking has to buy many things before, and subsequent to, manufacture. It trades in its own commodities—in gas, in residual products, in gas-using appliances and fittings; and more time and a larger staff have to be devoted to the trading part of the enterprise than to any other individual part. There is trading of the first magnitude by gas undertakings; and its ramifications are great. Then there are gas engineers who are interested in trade—not only in connection with the undertakings of which they are in executive control, but outside them. There are gas engineers who are interested in retort-settings and in other forms of plant which they have invented, or taken part in inventing or developing. They have a right to the fruits of their brains. There are engineers who are interested in burners, gas-fires, and so forth; and there are engineers who have made good sound investments in businesses outside the gas-supply industry. They are all traders—more or less. But they are called "gas engineers." Yet in their official capacity, in many cases, more time is devoted to the trading of their undertakings than to engineering work. There are remarkable contrarieties in our methods of description.

Supposing we think of the men chiefly responsible for the conduct of the engineering and manufacturing firms of the industry as something other than "traders," and then perhaps we shall get into proper focus their relationship with the gas-supply industry. Supposing we think of many of them as men accomplished in design and inventiveness. Supposing we examine the firms one by one, and then ask how it is they are in the position that they occupy to-day; how it is they have done so much that has been of advantage to the gas-supply industry? Is it because they are simply "traders?" Truthfulness compels the answer, compels the recognition, that their achievements are due to great technical ability and constructiveness, without which the gas-supply industry—this is said deliberately—would not have been in the position it occupies to-day. It is an absurdity of the crudest and most ungenerous kind to dub such men "traders," and nothing more. Who has been responsible for some of the finest developments within our times in carbonizing plant, in material-handling equipment, in exhauster, purifying, and other plant, in gasholders, in sulphate of ammonia plant, in benzol-recovery plant, in laboratory apparatus, in gas-fires and cookers, in water-heating apparatus, in industrial gas-furnaces, in gas-engines, and so on? Has it been the gas engineer, or those whom a few—and we believe they are only a few—gas engineers choose to recognize as merely "traders?" Comparisons are sometimes odious, and apt to put one in an invidious position. But there must be fairness, and fairness demands proper recognition. Let the foolishness be stopped as to the trading element of the industry being all on one side, and the technical ability and wisdom all on the other. All are working to the one great objective; all are interested in the maximum possible success of the gas-supply industry. The Society of Chemical Industry, of which Mr. Charles Carpenter, D.Sc., is President, has in its membership great manufacturing chemists who are also traders; and the President is also a member of the Provisional Committee of the new Association of British Chemical Manufacturers. The Institution of Civil Engineers has in its composition men who are engineers and inventors, and are engaged in trade. On the other hand, in the membership are men who have never been known to invent anything in engineering, and men who have designed engineering works that have not been guilty of any departure from known principles and types in the constituent parts, but are merely works fitted to certain conditions. Yet on their letter paper is printed "M.Inst.C.E."—equally with men who are real engineering inventors and constructors—and yet are traders! These things make certain distinctions in other quarters seem to be highly amusing.

If these matters are pondered, there will assuredly be a more broad-minded view and clearer discernment in those quarters where, on the particular subject discussed here, the reverse appears to prevail. Credit should be given to our manufacturing firms for all they have been, for all they are, and for all they hope to be to the gas-supply industry. Given that credit, no one will deny them proper place and proper recognition. Such place and such recognition are theirs by right. Some may say otherwise, but who can say so justly?

A Remarkable Legal Case.

There will be found on another page of this issue a report which sets out the main points in an action which was tried in the North of England last week. The defendants were the Blyth Gas Company, and the plaintiffs the North Eastern Railway Company, who maintained that damage had been done to an embankment of theirs by a fire caused by the heat from the below-ground level portion of a retort-setting on the defendants' works. The embankment was built many years ago; and after the fire started, it was discovered to be largely composed of small coal. This coal eventually got alight, and was burnt out; and then the embankment subsided. That the action is a peculiar one is evident from the fact that, though, during the hearing, various other cases were cited, they were not very similar, and none was in connection with a gas-works. The action was for negligence and trespass; but though the Judge ultimately decided that the fire was due to the heat from the retort-setting, he did not hold that it was owing to any negligence on the part of the Gas Company, but found that there had been a nuisance caused by them through the heat evolved. Judgment was therefore given for the Railway Company.

Transport of Materials and Manufactured Goods.

There has just been issued a summary of the evidence taken by a Sub-Committee of the Advisory Committee of the Board of Trade on Commercial Intelligence, in the course of their inquiry with respect to measures for securing the position after the war of certain branches of British industry. The representations included Government assistance in the promotion of scientific research in the interests of trade and industry, the amendment of the existing law as to copyright, patents, trade marks, Merchandize Marks Act, &c., improvement of transport facilities, financial assistance (such as industrial trust companies), and the conditions to be attached to loans to foreign countries, and the protection of British trade marks abroad. But the improvement of transport facilities is urged as exceedingly important. The gas industry is largely dependent upon cheap transport; and its prosperity relies considerably upon the development of trade in this country, which, in turn, requires cheap transport. Complaint is made that British trade—home and export—is severely handicapped by the excessive cost of railway and shipping freights, as compared with those borne by foreign competitors. German competitors enjoy preferential transport rates on goods for export. Large trucks are also used, having double the capacity of the major part of English trucks; and rates are at per truck instead of at per ton. The advantage of this would cut both ways for the gas industry, dealing as it does with such diverse materials—in space occupied by a ton—as (say) coal and coke, constructional material and machinery, and a range of manufactured goods running between gas engines and gas mantles. It is alleged that combination exists among the British railway companies to keep up the rates, and that canals are throttled by their control by the railway companies and by high toll dues, while in Germany, Holland, and France there has been large development of the waterways. With the proper development of British canals, would come immense advantage to home trade, and material relief of the railways from much slow traffic. The British Electrical and Allied Manufacturers' Association have suggested a conference of representatives of shipowners, railway companies, and the manufacturing industries, to discuss the question with a view to co-operation in removing

the existing handicaps under which British industries labour when in competition with foreign producers. This should interest sulphate of ammonia manufacturers and gas plant and apparatus makers. A further proposal is for an impartial department of the Government to be set up, to exercise the functions of a tribunal for adjusting grievances existing between railway and transport companies and traders.

Scientific Teaching and Industry.

Since the war started, the birth rate of Committees has gone up remarkably. Almost every day we see announcements that the Government, or a Government Department, has appointed a Committee for some purpose or other. To keep all these appointments in mind is more than any single individual can manage. It is hoped that a vast amount of good to the country is coming out of it all; but at the moment the multiplicity of Committees is grandly confusing. As one Committee succeeds another, the newcomer appears to have an excellent opportunity for doing something effective. But the Committees come, and then one after another they seem to disappear behind an impenetrable veil, and are not heard of again for a very long time. It would keep the country more interested in all this national work if some means could be devised whereby the public would be kept informed as to what the Committees are doing. It is now understood from Lord Crewe, President of Council, and the Chairman of the Privy Council Committee on Scientific and Industrial Research, that a Special Committee is to be appointed to consider the important question of incorporating the teaching of science in our national system of education. This announcement was made at a meeting last Friday of the Governing Body of the Imperial College of Science and Technology, the Professors at which recently memorialized Lord Crewe on the subject. The new Committee holds out promise in that it is not to be a departmental one, but one strongly composed. It is to have in its constitution scientific men in whom the country have confidence (which is put as though the country has not confidence in all scientific men), and men who are in a position to fully appreciate the advantages of the application of science to industry. Part of the duty of the Committee will be to advise the authorities how to promote the advancement of pure science, as well as of the interests of trades, industries, and professions dependent on the application of science. The Committee will seek co-operation by different seats of education, and especially by universities, colleges, public schools, and secondary schools. This is one of the most sensible suggestions yet made in connection with the importation of scientific instruction into our educational system. Some of the schemes previously put forward for the development of scientific work have flown beyond our established Universities, colleges, technical schools, and so forth—seeking for something entirely new and wonderfully ambitious, instead of setting to work to make a beginning by utilizing to better advantage that which we already possess. All this work is belated by many years. If our manufacturers had had scientific work incorporated in their education, there would have been to-day a greater valuation of scientifically trained men and of their utilization in industry.

Some More Municipal Figures.

This and immediately preceding issues of the "JOURNAL" set forth the results, both working and financial, for the past twelve months, of a number of municipally owned gas undertakings. It is seen that at Belfast the net profit after deduction of interest charges at £62,400, is more than double what it was a year ago; and after making allowances for sinking fund and reserve, and contributing handsomely for public purposes, a big sum remains to be carried forward. In the case of Bradford, the quantity of gas sold shows a decrease of practically 11½ per cent., of which 7 per cent. is due to the curtailment of street lighting. It is thought that probably an increase of 5d. per 1000 cubic feet made in the price of gas has accounted for some portion of the reduced consumption. While the gross profit for the year amounted to over £48,000, the result is a net loss of £2800, which, however, is a distinct improvement on the previous twelve months, when there fell to be recorded a net loss of £14,500. The effect of the lighting restrictions, and the desire of consumers to economize, has manifested itself at Bury (Lancs.); but the undertaking has come through a difficult year on the right side. The trading result at Coventry is described as "marvellous;" and already the need for extensions at the comparatively new Foleshill works is more than hinted at. The output of gas is up 15 per cent.; and there is a net profit of £15,500. Then, again, at Middlesbrough there is recorded by far the largest gross profit ever made there (over £29,000), and this without the ratepayers having been called upon to pay more for their gas. The coke-oven supply of gas is evidently satisfactory. At both Mossley and Oldham the gas consumption was practically the same as in the previous year. In the case of Oldham, the average quantity of gas made per ton of coal carbonized was 13,166 cubic feet. The net profit on the year's working is nearly £27,000. There is reported from Stourbridge a substantial increase in sales, practically the whole of which was supplied by a reduction in the quantity unaccounted for. The result of the financial year's working at St. Helens is a net profit of close upon £4000; the production of gas per ton of coal constituting a record for the undertaking.

The Nitrate Half Year.

Though it is not practicable at the present juncture to quote definite figures with regard to consumption and stocks of nitrate of soda during the first half of the present year, it is evident that, the circumstances being as they are, the consumption in this country for agricultural purposes must have exhibited a substantial falling off. In fact, in their half-yearly report, Messrs. W. Montgomery and Co. express the opinion that the quantity so used has probably been 20 per cent. less than in normal years. On the other hand, the consumption of refined quality for explosive purposes has naturally again been very large. In America, the consumption during the past twelve months shows an increase of no less than 112 per cent. over the preceding year (from 493,000 tons to 1,043,500 tons); and it is remarked in the report that it would probably be safe to say that the whole of the increase was used for the manufacture of explosives. Other countries have likewise increased their consumption enormously. As a result of the restricted supply, which arose through freightage difficulties, prices on this side have throughout the season had an uninterrupted advance. Early in January, prompt 95 per cent. nitrate in Chili was quoted at 7s. per quintal; while to-day, it is stated, prices are about 7s. 6d. per quintal for ordinary and 8s. for refined quality, any position this year. Considerable transactions have taken place for 1917 at from 7s. to 7s. 3d. per quintal for ordinary and from 7s. 3d. to 7s. 8d. for refined quality; while business is reported over 1918 at 7s. for ordinary quality. In contrast to this rise in prices, the production for the last six months has amounted to about 32,283,000 quintals, against 12,644,000 quintals during the same half of 1915—which represents the big increase of 155 per cent. With reference to the future, so long as the demand for explosives purposes continues with an accompanying scarcity of freights, Messrs. Montgomery and Co. do not see any reason to anticipate lower prices. On the other hand, there are to be observed signs of a weakening of freights in certain directions, which might extend to the nitrate districts. In closing their report, they make the suggestion that it would be considered by the importers of nitrate a gracious act "if the Board of Agriculture took them into its confidence at an early date, so that provision for the wants of agricultural consumers next season might be made, so far as it is possible to make them." The reason for putting forward this suggestion is that importers cannot be expected to run the heavy risk attached to present values for a position so far ahead as next spring, some guarantee that their purchases will not be overlapped by Government buying.

Gas Undertakings Returns.

With reference to the statement appearing in last week's "JOURNAL," to the effect that the order for returns relating to authorized gas undertakings for the year ended Dec. 31, 1914 [in the case of companies], and March 31, 1915 [for local authorities], had been read and discharged by the House of Commons, it may be safely assumed that this is only a temporary decision; and there is no reason to doubt it is the intention of the Board of Trade to resume the publication of the returns after the war. What will in all probability be done, both in regard to the year named and the succeeding twelve months, will be, while refraining from publishing the details in respect of each undertaking, to prepare and issue the totals of some of the more important items. In this connection, it is, of course, within the knowledge of many of our readers that the Board of Trade have issued forms asking for particulars for the year ended December, 1915, and March, 1916. Thus will be preserved the continuity of the returns, and their universally recognized usefulness for comparative purposes.

PERSONAL.

Mr. FRED. THORNTON, of Skelmanthorpe, has been appointed Manager of the Meltham (Huddersfield) Urban Council gas undertaking, at a salary of £120 per annum.

The Mayor of Brighouse, Alderman ROBERT THORNTON, J.P., was created a freeman of the borough last Wednesday, on which day was being celebrated the eightieth anniversary of his birth. He is Chairman of the Longwood Gas Company, and Vice-Chairman of the Elland-cum-Greetland Gas Company.

Sergeant-Major J. O. C. LAING, 21st County of London Regiment, 1st Surrey Rifles, who has been awarded the Military Cross for an act of great gallantry in saving a wounded comrade, is one of the seven 1st Surrey Rifles who have gained this distinction. He is a member of the staff of Messrs. M. Bateman and Co., of Brooke Street, Holborn, E.C.

At a special meeting of the Barnoldswick Urban District Council last week, the resignation of Mr. J. W. THOMPSON, Gas and Water Engineer and Manager, who recently was the successful candidate in the selection of a new Manager for the Ripon Corporation Gas-Works, was considered, and it is understood that, in view of the important water-works extensions in contemplation at Barnoldswick, Mr. Thompson's services are to be retained, under a three years' agreement. This development was not altogether unexpected in Yorkshire gas engineering circles.

Mr. WILLIAM A. TWINE, the Chemical Superintendent to the Birmingham Corporation Gas Department, has been invited by Lord Moulton to assist the Ministry of Munitions of War (Explosives Department) in the erection of chemical plants in different parts of the country. Mr. Twine has had more than twenty years' experience in the manufacture of acid and alkali; and it is by reason of his wide knowledge of the manufacture of alkali that Sir Hallewell Rogers (the Chairman of the Birmingham Gas Committee) has consented to allow him to serve in an advisory capacity under the Minister of Munitions.

A special meeting of the Ripon City Council was held last Friday, when Mr. JOHN DEMAIN, the Manager of the Garforth Gas Company, near Leeds, was appointed Gas Manager. Only a fortnight ago the Council appointed Mr. J. W. Thompson, of Barnoldswick, as Gas Manager; but he wrote that "owing to change of circumstances" he was unable to take up the position. Mr. Demain has been seven years at Garforth, prior to which he was at the Otley Gas-Works for eleven years, part of which time he was Assistant Manager. Since Mr. Demain's appointment as Manager and Secretary of the Garforth Company, the works have been remodelled entirely, and the latest type of retort-settings installed, as a result of which the output of gas has increased by 250 per cent.

OBITUARY.

The death is announced as having taken place on the 18th ult., at the age of 74, of Mr. JAMES RITCHIE, of Almora Hall, Middleton St. George, near Darlington, the principal of James Ritchie and Sons, Limited, cast-iron pipe manufacturers, of Middlesbrough.

Mr. JAMES M'ILROY, J.P., of Banbridge, whose death has been announced, was one of the principal promoters of the Portadown and Banbridge joint water scheme, and a member of the Water Board since its inception. He was also a Director of the Banbridge Gas Company.

The death, in his 83rd year, of Dr. A. FRANK, a Professor at Charlottenburg, took place recently. He was one of the most distinguished and most versatile of the pioneers of German chemical industry, doing especially good work in the sixties in connection with the working-up of the Stassfurth salts. His method for the recovery of bromine is still in use. Later, in conjunction with Dr. Caro, he was instrumental in founding the nitrolim or calcium cyanamide industry, which has become so useful to Germany since her supplies of nitrate of soda have been cut off. In the gas industry, Dr. Frank was known for his work in collaboration with Caro and others on acetylene and the recovery of nitrogen from peat and other fuel gasified in producers, and his share in developing the Charlottenburg gas undertaking. He maintained a keen interest in technical matters until the last. It is only a few months since an abstract of a topical and suggestive paper by him, on "The Utilization of Waste Heat in Gas-Works," was published in the "JOURNAL" [Vol. CXXXIII., p. 523].

It is with regret that we have to record the death, at his residence at Golder's Green, on Monday of last week, of Lieutenant-Colonel THOMAS WILTON, at the age of 56. Just about a year ago, the Directors of the Gas Light and Coke Company had to accept his resignation, owing to ill-health, of the position of Superintendent of their Products Works, the staff of which he joined, in 1880, soon after the works were erected—quickly rising to the position of Superintendent, which he retained for some thirty years. As Lieutenant-Colonel of the "Rangers," he was keenly devoted to his military duties; and it was felt his whole-hearted energy in this direction had had much to do with impairing his health. On the outbreak of war, the "Rangers" were mobilized; but as Lieutenant-Colonel Wilton was medically unfit to accompany them to the front he remained in this country, still working hard, training the reserve battalions. His excellent work in the designing of chemical apparatus is well known; and it may be mentioned that at one time his brother, Mr. George Wilton, of the Chemical Engineering Company, worked with him at Beckton.

THE COAL SUPPLIES OF GAS AND ELECTRICITY UNDERTAKINGS.

Deputation to the Board of Trade.

Mr. D. Milne Watson forwards for publication the following memorandum with regard to a deputation to the Board of Trade on behalf of gas and electricity undertakings, on the subject of coal supplies.

A deputation of representatives of gas and electricity undertakings consisting of the following gentlemen:

Mr. A. E. Broadberry, the President of the Institution of Gas Engineers. Mr. H. E. Jones, the Chairman of the Gas Companies' Protection Association. Mr. Alderman Phillips, the Chairman of the Salford Corporation Gas Department. Mr. D. Milne Watson, the Managing Director of the Gas Light and Coke Company. Mr. Alex. Wilson, the Manager and Engineer of the Glasgow Corporation Gas Department.	Representing the Gas Industry.
Mr. R. A. Chattock, the City Electrical Engineer, Birmingham. Mr. C. P. Sparks, the President of the Institution of Electrical Engineers.	Representing Electricity.

waited on Mr. Marwood of the Board of Trade on the 29th of June, and laid before him the various difficulties which were being encountered by the above industries at the present moment—more especially those with regard to the making of new contracts for coal for the next twelve months, both as regards quantities and prices.

The deputation was most courteously received by Mr. Marwood and Mr. Carlill, who, after the various members of the deputation had stated their case, informed them that the Board of Trade were prepared, if approached by the gas, electricity, or water undertakings, to use their influence, through the medium of the District Coal committees which had been established in various colliery areas, to procure the necessary quantities of coal required by the above-named undertakings.

With regard to prices, it was further stated that if any undertaking which had cause to complain of the prices proposed to be charged for new contracts would bring such cases before the Board of Trade, the Board would be prepared to take steps, if thought necessary, so that the prices charged should be justified by the provisions of the Price of Coal (Limitation) Act.

German Ammonia Association.—The "Chemical Trade Journal" states that the report for 1915 of the Deutsche Ammoniak Verkaufs Vereinigung of Bochum mentions that the sale of sulphate of ammonia, converted into 25 per cent. salts, amounted to 364,067 tons, as compared with 406,476 tons in 1914; and only a portion of the former quantity was placed at the disposal of agriculturists. The stocks at the end of the year were inconsiderable, consequent on the large sales which took place in the spring.

Producer-Gas Plants in America.—The demand for producer-gas plants has, says "Iron Age" (New York), become heavy in those parts of the Central West where manufacturers have been depending largely upon natural gas for fuel. This is due to a considerable extent to the fact that one leading distributor of natural gas has given notice to its larger consumers that the supply of natural gas for manufacturing purposes will be cut off in the near future, to conserve the supply for domestic uses. Particularly heavy is the demand for the glass industry, which is now installing producer gas equipment to replace natural gas. In this industry, cold producer gas is being employed for the various melting and annealing operations formerly done with natural gas, hot producer gas, and oil fuel.

Chemical Society and Alien Enemies.—A correspondent writing to the "Financial News" states that, at an adjourned extraordinary meeting held last Wednesday week, the Chemical Society passed the following resolution: "The Chemical Society considers it is neither compatible nor consistent with its loyalty to the Crown, whence the Royal Charter under which it works was derived, to retain any alien enemies upon its list of honorary and foreign members. It is therefore resolved that the names of A. von Baeyer, T. Curtius, E. Fischer, C. Graebe, P. H. R. von Groth, W. Nernst, W. Ostwald, O. Wallach, and R. Willstatter, who were elected under happier conditions in recognition of their eminent services to chemical science—for which the Society still holds an undiminished appreciation and regard—be, and they are hereby, removed from the list of honorary and foreign members."

REGULATION OF COAL SUPPLIES.

Power Conferred to Secure Precedence.

It is announced by the Board of Trade that the following regulation was made last Tuesday by Order in Council, under the Defence of the Realm Acts.

> 2D. It shall be lawful for the Admiralty or Army Council, or the Minister of Munitions, or any person authorized by them to act in their behalf, after consultation with the Board of Trade, to give directions as to the priority to be given in the execution of orders or contracts for the supply of coal or coke, with a view to securing precedence for orders or contracts in accordance with their national importance; and the owner, agent, or manager of any mine, or any other person affected by the directions, who fails to comply with any directions so given, and any person who in any certificate or document given or issued for the purpose of securing priority for any order or contract in pursuance of such directions makes any false statement or false representation, shall be guilty of an offence against these regulations.

Up to the present, the District Coal and Coke Supplies Committees appointed by the Board of Trade have supervised the distribution of coal, in order to secure supplies for munitions works and other important consumers, without specific statutory powers. Difficulties have, however, occasionally arisen, owing to the fact that a direction from one of these Committees does not in itself give legal authority for the suspension of deliveries under a contract; and it has been thought desirable to make express provision for protecting a contractor who has been directed to divert his coal in the national interest.

Section 1 (2) of the Defence of the Realm (Amendment), No. 2, Act, 1915, provides:

> Where the fulfilment by any person of any contract is interfered with by the necessity on the part of himself or any other person of complying with any requirement, regulation, or restriction of the Admiralty or the Army Council under the Defence of the Realm Consolidation Act, 1914, . . . or this Act, or any regulations made thereunder . . . that necessity is a good defence to any action or proceedings taken against that person in respect of the non-fulfiment of the contract so far as it is due to that interference.

The new regulation consequently confers the necessary powers on the Departments named, after due consultation with the Board of Trade.

The work of the District Coal and Coke Supplies Committees has hitherto been carried on by general consent; and there have been few cases in which serious difficulty has been experienced. It is intended to continue the same procedure; and it is hoped that the occasions on which it is found necessary to exercise the powers conferred by the new regulation will not be frequent.

Economy in Coal Consumption.

In their political notes on Friday, "The Times" said: The Government are giving very serious attention to the need for greater economy in the consumption of coal. Official circulars have been sent to all munition factories, electric light, gas, railway, and steamship companies, urging them to curtail their use of coal in every possible way. The output of coal in this country has been diminished by several million tons since the beginning of the war, and exports have naturally fallen off. But the Government are determined that the demands of our Allies shall be met; and there is no alternative but economy at home. Among other suggestions which the Board of Trade are examining is the issue of coal tickets on a rationing plan, similar to that which has been adopted in the case of petrol.

SUPPLIES OF ENGLISH COAL TO FRANCE.

Official Importation Regulations.

For the purpose of regulating the supplies of coal to consumers in France by English collieries and exporters, the French Government have established a Coal Committee, by which French demands will be accepted, supervised, forwarded to the French Coal Committee in London, and by the latter body passed on to the Local Committee in each district.

Demands are to come from "importers," who are officially defined as: (1) French consumers buying coal directly from England and taking delivery in French ports in their own name. (2) Merchants, in France, buying coal in England, taking delivery in their own names for re-sale to their customers. (3) Commission agents in France, buying on behalf of their customers, and receiving cargoes in their own or their customers' names. (4) Authorized representatives in France of English exporting firms. Consumers are classed into six groups—viz., railway, gas, electricity, metallurgy, navigation, and miscellaneous; the five chief groups submitting to the French Committee a list of those of its members taking at least 200 tonnes of English coal per month. Smaller consumers will be grouped together, and otherwise dealt with.

Applications for supplies are received by the French Committee in Paris, by whom the quantity authorized is notified to the applicant—the latter then renewing his application in accordance with this decision, stating particulars of previous contracts into which he has entered, and naming the English exporter or colliery by whom he prefers to be supplied. The Paris Committee then authorizes London to make delivery, subject to restrictions which may be imposed by the Coal Export Committee and the Local Committees in England.

The latter (consisting of colliery proprietors, exporters, and shippers) receive applications from the London Committee, and supervise deliveries by arrangement with various collieries and with regard to previous contracts and the statement of preferences transmitted from Paris. They likewise exercise control over the available freightage. Exporters and colliery owners nominated by the Local Committee are then to conclude contracts and freightage terms with the buyers, and superintend the loading of cargoes and the prompt departure of vessels.

Cases presenting difficulty are to be referred to the Committee in London. The remuneration of exporters or of collieries selling direct is fixed at 5 per cent. on the price of coal f.o.b., with a maximum of 1 per cent. per tonne.

Contracts entered into prior to May 25 are to be maintained subject to permission to import into France and to export from England. They require to be specified by importers when making their applications.

The arrangement is based on the principle that, on the one hand, exporters shall not compete, nor seek to exercise preference; and, on the other, that the control established in France shall prevent an importer from obtaining more favourable treatment than his colleagues.

In order to facilitate freightage, importers are to keep the Paris Committee informed in regard to any new means of transit which appear to be practicable; such suggestions being immediately communicated to the Local Committees, to be employed in the common interest.

While it is intended that applications should cover a period of three months, the first application is for the months of August and September.

The cost of the control by the Paris and London Committees is defrayed by a charge of 5 c. per tonne in respect to all applications passing from Paris to London.

ELECTRICITY SUPPLY MEMORANDA.

The proceedings at the annual meeting of the Incorporated Municipal Electrical Association are always interesting. From them one generally hears a good deal concerning hopes and aspirations, and the failure of some of them to materialize, as well as of the enormous scope for electrical development as visioned by members—if only correct appliances were forthcoming. The recent meeting was no exception to what has become almost a general rule. The President this year was Mr. A. C. Cramb, the energetic Electrical Engineer of the Croydon Corporation. In his address, he, like many of his predecessors, brought down for its annual "dusting" the Association's Bill for conferring hire and hire-purchase powers on municipal electrical undertakings, as well as certain extraordinary authorization. The position of the Bill remains as it was, and so it is likely to continue until some time after the war. The electrical contractors—the strong opponents of municipal electrical venture where it trespasses upon the interests of private enterprise—cannot be conciliated. The British Electrical and Allied Manufacturers' Association tried to act as mediators, but failed. The promoters of the Bill also offered to guarantee the contractors all the wiring work (this it was thought would be greatly increased by the hire and hire-purchase schemes which would be created on the passing of the Bill), and to limit supply undertakings to prices which contractors could underquote. But the contractors were not to be caught by the bait. They know full well that, notwithstanding the power to underquote, this would not be worth much to them, seeing that the tendency of both old and new consumers would be, with hire and hire-purchase powers in the hands of the electricity suppliers, to go to those suppliers with their business rather than to the contractors. The contractors will duly note the concluding words of the President on this subject, which are prophetic and minatory. The Association, he says, will at an opportune time press for the Bill; and the powers will come, and possibly in a much fuller form than is now asked for. As to the threat, he remarked: "It has been the aim of the Association to effect an agreement equitable to the various interests; but it may become necessary to adopt a more active policy to create a greater desire for a settlement." So warned, the contractors will be extra watchful, and will see to it that the method that is effective in "creating a greater desire for a settlement" takes a more congenial form than that of a scourge.

Municipal Speculation Bill.

Domestic Development Plans and Difficulties.

From the foregoing, it is seen that one project of the Association has so far failed in maturing, though hopes of final success of an inflated order still repose in some minds. Another scheme has not advanced far. That is the work of the Development Committee, the members of which appear to have had sufficient to do of late to look after their own local and official affairs. But Mr. Cramb says the work of the Sub-Committee dealing with questions of electrical apparatus for heating and cooking is urgent and important. And small wonder, because the President acknowledges that, after all the boasting there has been regarding the perfection of electric cooking and heating appliances (of which no one has better opportunity than gas suppliers of learning the exact facts from dissatisfied and tormented users), there is still much work to be done to bring them into a fit and proper condition. Years and years of work and experience are at the disposal of manufacturers; yet the confession that, in connection with cooking appliances, "there are many matters of detail, but of great importance to success, which actual experience has demonstrated require consideration." "Many" and "of great importance" are significant. At the same time, Mr. Cramb says the passage of the Association Bill blocks the main possibilities to business. But the usefulness of the Bill in assisting the municipal authorities to obtain business at ½d. to 1d. per unit (capable of developing 3420 B.Th.U., *if* appliances could be found possessing 100 per cent. efficiency), will be largely destroyed if the apparatus shows such tardiness in getting into a healthy working condition. However, Mr. Cramb thinks that most valuable assistance could be rendered by the National Physical Laboratory in solving problems connected with electric cooking and heating. This all shows what an uphill task electrical undertakings have in respect of their cooking and heating business. Parliament, the National Physical Laboratory, manufacturers and contractors, electricity suppliers, electricity at ½d. and 1d. per unit (while lighting consumers pay in normal times from 4d. to 6d.), must all be brought to the aid of the electrical industry if the business is to make a really substantial advance movement. Further, and this will be noted by the gas industry, the Publicity Sub-Committee have been instructed to prepare a scheme for the development of a proper publicity organization in this country. All that has been previously done here in reference to electrical publicity propaganda is not regarded respectfully in some quarters of the industry.

Daylight Saving and Charges.

The development of the use of electricity for purposes other than lighting in residential areas has, Mr. Cramb considers, become still more imperative owing to the advent of the Summer Time Act, and apparently he envies gas undertakings in having anteceded the time change by developing the heating and cooking load. Gas undertakings, he says, can regard the loss of revenue in this direction with less concern—"this direction" being the extra hour of daylight put into the active part of the day. But Mr. Cramb may be reminded that there are three differences between the positions of the gas and electrical industries in respect of the heating and cooking business. They are that the initial costs and the expenses of fixing and maintaining gas appliances are lower than in the case of electrical appliances; that, notwithstanding, gas for cooking and heating can be, and is generally, charged at lighting rates, and not at a figure representing a small part of the lighting rate; and that, also notwithstanding, in the case of gas B.Th.U. are relatively wonderfully cheap. Again in this connection, Mr. Cramb hints at the unsuitability of electrical appliances when he remarks: "My own experience in bringing before the householder the merits of electricity for domestic purposes has convinced me that there is a very large potential demand if only the electrical industry is ready with a supply of *suitable* apparatus which can be obtained by consumers on terms comparable with those to which they have become accustomed." Then he applauds the courage and foresight of those who in residential areas had, prior to the present conditions arising, adopted the Norwich or similar system, under which a fixed lump sum is paid, and an additional ¼d. or ⅜d. per unit (as the case may be) of current consumed. This suggests a point. When the rateable value system was introduced, it was asserted that it had been worked out on the assumption that the lump charge and the units at the cheap rate used for illumination would together about equal the sum of the account under the previous order of things, and so all additional units used would merely mean a charge of ¼d. or ⅜d. per unit. Therefore householders who were foolish enough to desire to do so could through one meter use electrical energy for heating and cooking at a very low extra cost. But now with greater daylight utilization, it appears that some consumers only light-up just before retiring to bed, and some only for the purpose of preparing for bed. This means that a smaller proportion of the lump charge applies to the summer months and a larger proportion to the winter than heretofore; so that in the summer months, under the rateable value system, householders who only use electricity for lighting stand to be considerable losers. The reply to this is: "Then let them be consumers of electricity for cooking, and gain some advantage that way." But will they? Just think of what Mr. Cramb says as to the "many matters of detail" "of great importance to success" that still "require consideration." Think, too, of what the "Electrical Times" recently said, when noticing the American gas-electric cooker, as to the inability of present-day top-plates to compete with gas [see last week's "Memoranda"]. Regarding the percentage addition to charges specially in respect of daylight saving, the undertakings that have adopted this form of compensation intend it to apply to the whole year's accounts, and not to the summer quarters only. The point was raised in the House of Commons on Monday last week by Sir F. Lowe, who asked Mr. Harcourt to undertake to see that the increased charge is not continued during the portion of the year when the Summer Time Act is not in operation. Like a wise man, Mr. Harcourt, before making any promise, said he would ascertain what his powers were.

America and Cooking.

In America a special campaign is being prosecuted throughout the States in favour of electric cooking. Referring to it an American gas contemporary gives the following "tip" (from an article in the "Electrical World") for what it may be worth: "But it is probably in the field of electric cooking and electric range that the most significant 'drive' has been waged during these crowded twelve months. On the Pacific Coast, in Central Illinois, and in the conservative capital of Massachusetts, centres of electric cooking activity at special low rates have been established; and the contagion has spread, until now nearly 3000 communities—a good 30 per cent. of the total number of service stations in this country—have electric cooking rates of 5 c. per kilowatt-hour or less. Already several thousand ranges are in service in apartments and homes, East and West; and manufacturers have estimated that $1,000,000 worth of electric ranges will be sold during the present season." The electric-cooking ranges in America must be superior to those in this country, or the gas-ranges must be very inferior. At any rate, 5 c. per kilowatt-hour would in this country stand a very poor chance in competition with gas prices.

Water Heating—Rejected Apparatus.

Our old friend Mr. H. H. Holmes, the energetic sales booster of the Marylebone Electricity Department, blossoms out in print again. This time it is in an article in the "Electrician" on "Electric Hot Water Supplies." For years Marylebone has boasted that water heating can be done as cheaply by electricity as by gas, of which only 6½ cubic feet has approximately the same thermal value as a unit of electricity. Now it seems that all the appliances ever invented until just lately for the purpose of water heating by electricity are discarded by Marylebone in favour of the latest type. Something or other has been found wrong with the predecessors, although at their birth they were all duly praised in succession. The first efforts were to provide a 100 per cent. load factor or heat-storing apparatus. Marylebone has awakened to the fact that a 100 per cent. load factor is not necessarily the best possible for an existing station; for so long as the demand is an off-peak one, "quite as low or even lower prices could be quoted as for a 100 per cent. load factor." It was also overlooked that cheap units alone will not give low quarter's bills. A 100 per cent. load factor apparatus must mean 24 hours per day continuous heat loss, or, in other words, *the maximum possible heat loss*. Another point is that a 100 per cent. efficiency electric water-heating apparatus (which does not exist, but which data show is electrically claimed) does not give a corresponding efficiency in meeting the demands of the average household, in which baths are wanted for about an hour or so in the morning, and only limited supplies for washing purposes are required during the other parts of the day. The apparatus does not provide for emergency demands; it makes no allowances for holidays; and a very small leak spells disaster. The electric-geyser came on to the scene; but even for washhand basin work, the loading had to be fairly high (5 to 8 KW.), and for bath work so high (up to 25 KW.) that switch-gear at once became more expensive than the hot-water apparatus itself. And a switch to break a 25 KW. load is no nice companion in any bathroom, and remote control is essential with all its expense. The heat losses, too, owing to the time it took to provide a bath, were considerable. The electric-circulator (used in the same way as a gas-circulator) followed. Here, again, the heat losses were "greater than need be;" the apparatus occupied space that could be ill-afforded; it was expensive in manufacture. May they all rest in peace.

The New Love.

Now we come to *the* heater which has captured the affection of Mr. Holmes. It is a well-lagged water-tank of desired capacity, fitted with immersion heater or heaters and thermostat. The advantages (as stated by Mr. Holmes) are: Low first cost; the heat losses reduced to a minimum (for the whole of the heat produced passes directly to the water, the only losses being those of conduction and radiation from the tank); and the existing hot-water tank in the house can be used, although in large installations it is undesirable to do so. We agree with this, in view of the tremendous heat losses by radiation with common types of house tanks. However, with this arrangement, Mr. Holmes considers the best possible plan is a hot-water tank at each point where hot water is required. The tanks are electrically loaded at bath points to provide a bath of hot water in twenty minutes from the time of switching-on; and the current is thermostatically cut-off after the desired temperature is reached. The current cannot be switched on again except by hand, which is a disadvantage. The tank being well lagged (which is always necessary with such an expensive heating agent as electricity), the water will

keep hot for "several" hours; and "the heat losses inseparable from a constantly ready hot water supply are thus eliminated." "Eliminated" is too strong an expression; for if there were no heat losses, the water would keep permanently hot until wanted, without further expenditure of current. Then we come to what appears to be a distinctly crude arrangement in the *modus operandi*. The size of the bath tank is 15 to 20 gallons; the temperature at which the thermostat operates being fixed at from 150° to 160° Fahr. When a bath is required, the cold water cock is opened; and the hot water is forced out of the tank—to be followed by sufficient cold water to reduce the bath temperature to (say) 95° Fahr. It will be seen from this that the system has distinct limitations, more especially in regard to temperature. The expenditure of current per bath of 25 gallons at 95° Fahr. is put at 3½ units. Assuming that the heating starts with a water temperature of 48°, and so has to be raised in the bulk 47° to 95°, Mr. Holmes, in quoting 3½ units, is relying upon a 100 per cent. efficiency! For sinks and cleaning water, the tank used holds about 1½ gallons; and the temperature at which the thermostat operates is 190° Fahr. The loading is 4 KW.; and it is said that 1½ gallons can be obtained every ten minutes. The expenditure of current for hot water for washing-up purposes is put at 1 unit for every 4 gallons at 130°. Mr. Holmes does not think much of the objections that may be raised—viz., that the system would give a poor load factor, and that the instantaneous demands would cause severe mains and pressure variation. He holds that with a central station supplying light and power, the load factor of any particular consumer or group of consumers does not matter; what matters is the load factor of the entire system. As to pressure variation, he submits that if this occurs in the daytime, it would probably pass unnoticed; and "so little demand is made in lighting hours, and the residential load for cooking and heating has increased to such an extent that demands of even 20 KW. on a well-laid-out system cause no inconvenience." Not all electrical engineers will give cheerful acquiescence to Mr. Holmes's contentions. As to his other points in praise of the latest system of water heating by electricity, experience will no doubt bring its lessons, as it has done in the case of the rejected predecessors.

A Slip and its Correction.

Apparently hard up for a point of criticism at our expense, the "Electrician" calls us to account for a slip in describing as "stalwart cast-iron columns" the steel columns which are used to support tramway trolley wires. We do not call a slip of the kind clever journalism nor clever engineering. If our contemporary casts its mind back, it will probably recall matters that have appeared in its columns which have been technical and journalistic absurdities, and, on certain occasions, they have obviously not been slips, but deliberate statements.

British Trade after the War.

Increasing thought is being given to a consideration of the problems which are likely to present themselves in the commercial world on the cessation of military strife; and there has in important directions been manifested a commendable desire to seize time by the forelock, by taking, as far as practicable, steps in advance to meet the new set of circumstances which will arise. The business man, as well as the scientific one, will need all the aid he can get in this struggle; and it is with the idea of affording him help that Mr. Ernest J. P. Benn has written a readable little book, entitled "Trade as a Science," the publishers of which, at 2s. 6d. net, are Messrs. Jarrold and Sons. Not the least interesting chapter of this is an introductory preface by the Rt. Hon. Lord Burnham, M.A., who points out that the real purpose of German industrial organization and enterprise before the war was to knock Great Britain out of the world-market, and take her place; and she hopes to start again the instant that peace is declared with a more perfected organization and a more intense application than ever before. As to the author's views, which are strongly enunciated, all that can be said here is that an indication of the direction they take is contained in the opening sentence of the second chapter: "Almost the only civilized creature on earth who is not organized is the British business man; and in dealing with the problems of the organization of trade, it is as well to admit at the outset that the greatest difficulty in the road is the personality of the Briton."

Dye Research Work at Manchester.—It was announced at a meeting of the Education Committee on Monday of last week, that the staff of the Manchester School of Technology is to receive an important addition. Professor Green, who is leaving the Leeds University to engage in research work for Messrs. Levinstein and Co., has undertaken to devote part of his time to the School of Technology. As the result of this, it will be possible to set up a new sub-department for advanced study and research in the chemistry of coal-tar products and dyestuffs. With two such men as President Knecht and Professor Green—the one an expert in the use of, and the other in the manufacture of, dyestuffs—the Manchester School of Technology should, said Sir Thomas Shann in making the announcement, be second to no other English college or university in this most important branch of applied science.

THE INSTITUTION OF GAS ENGINEERS VENTILATION RESEARCH COMMITTEE'S REPORT.

Professor Cobb Replies to Criticism.

Professor JOHN W. COBB writes as follows in response to comments on the work of the Livesey Professor at Leeds University and Secretary to the Ventilation Research Committee, which have appeared in the Technical Press since the meeting of the Institution.

The interest which the third report of the Committee appears to have inspired is obvious from its treatment in the Press; and although it is unnecessary to make more than an appreciative acknowledgment in general, or a word of thanks to Mr. W. D. Helps, for further interesting particulars concerning the ventilating burner ["JOURNAL OF GAS LIGHTING," June 13, p. 599, "Gas World," June 17, p. 583], there are certain features of an editorial article in the "JOURNAL OF GAS LIGHTING" [June 13, p. 557] that call for comment.

The writer of the article appears to be of opinion that, because the Committee considers a complete study of ventilation must include that of existing installations, it is not justified in drawing definite conclusions from tests made under standardized conditions, in which certain variable and uncontrollable factors are not allowed to operate. The truth is surely that only when tests are carried out in some such way can any reliable information be derived. The elimination of disturbing influences is the basis of all successful testing. When results have been so obtained, the extent of the variation introduced by the other factors can be satisfactorily determined. Until then guesswork is the only ground of opinion. That is the reason why the Committee erected its special testing-room in which the results published have been obtained.

The article deals with injector-ventilating gas appliances, and incidentally criticizes our experiment in which the injector-tube is tested in the simplest possible way, using a simple ring-burner in a flue with and without injector-tube. As the writer of the article correctly indicates, "an injector-tube was put inside, partly choking the up-take tube, and reducing its carrying capacity." This is our own opinion as to the effect of introducing the tube; and its presence could only be justified if there existed some beneficial influence in the direction of inducing air-flow which more than compensated for the obstruction. In no one of our tests was any such compensation in evidence.

With reference to the paper read by Mr. Yates at the British Association meeting in 1915 (which is mentioned), it is perhaps sufficient to point out that no test was published there which offered a direct comparison between the "injector" fire and one with an auxiliary air-inlet of area equal to that of the injector-tube. Obviously, no other test can be decisive. We were not testing primarily a particular gas-fire, but a feature of gas-fire construction which was supposed to give enhanced ventilation as a consequence of "injector" action. That was one reason why the test was not made simply and directly on one make of gas-fire, but in several ways all leading to the same result. Another reason was that the invitations of the Committee to submit an injector fire for test were not accepted.

One welcome expression of opinion from the writer of the article is to the effect that when claims are made respecting the special excellence of a new feature of design embodying possibly some new principle, "there is an old and worthy adage which bids us hear both sides before passing judgment." If instead of simply stating "another side" it is possible to set out the reasoned opinion of a disinterested body of men drawn largely from the industry, so much the better. The Ventilation Research Committee has made its inquiry into this and other matters, and has reported exactly what it found.

EDITORIAL NOTE.

The editorial article to which Professor Cobb refers in the foregoing was published in the "JOURNAL" for June 13, so that the reply (which only reached us last Saturday) is somewhat belated. In dealing with it, we should like, in the first place, to assure Professor Cobb that we are only out for the truth; and therefore it is hoped that he does not regard our attitude as being in any way antagonistic.

It would be idle to argue with Professor Cobb as to whether or not the Committee were justified in drawing definite conclusions from tests made under standardized conditions. All that need be done is to repeat a quotation from the Committee's own report: "A question which suggests itself at once is as to how far conditions in existing installations resemble those of our experiments. An adequate answer will require the systematic testing of a number of existing installations." What was mainly objected to in our article was the very positive condemnation of all types of goods to which (rightly or wrongly under the conditions of construction, operation, and use) the term "injector" had been applied; and by the construction of which goods, it is claimed that the momentum of the products of combustion is increased with acceleration (through suction) of the indrawing of air from the room, and its discharge into the chimney flue—thus largely increasing the volume of air so passed. A further consider-

ation was that the condemnation in the case of gas-fires was made (as we understand the report) on the performance of the attachment of a device to an ordinary gas-fire, by which combination the experimenters considered they reproduced "*as nearly as possible* the method of applying the injector principle to gas-fires which has been adopted in practice." This they did not do; and "as nearly as possible" (as said in our editorial article three weeks ago), ought not to be good enough for scientific work, correct conclusions, and complete determination.

But to more specific points in Professor Cobb's reply. He alludes to our criticism of the blocking-up of part of a vent-tube with an injector-tube, without in any way proportioning the carrying capacity of the former to any extra work that might be imposed upon it. Professor Cobb defends the validity of this method of making comparison; and we will leave it at that. He also tells us that they were not testing primarily a particular gas-fire, but a feature of gas-fire construction which was supposed to give enhanced ventilation as a consequence of "injector" action. That is just what they were not doing. We only know of one type of gas-fire that has applied to it, rightly or wrongly, the word "injector;" and an attachment fixed to an ordinary gas-fire does not fairly represent the specially constructed fire. In conjunction with this point, and the allusion made in the previous editorial article to the paper read by Mr. H. James Yates, before the British Association in 1915, Professor Cobb says: "It is perhaps sufficient to point out that no test was published there which offered a direct comparison between the injector fire, and one with an auxiliary air-inlet of area equal to that of the injector-tube." Of course not, because there was not one made with such an area. But what we understood was that the then latest types of fires were put into comparison with the new fire, with flue-vents of approximate area (if not formation) to that of the injector ventilating fire. The additional air-inlet *just beneath the fire canopy* has not an area equal to the flue-vent; but the fact remains that the tests in the British Association paper show that more than twice the quantity of air was removed from the room than with the flue-vent only. The whole question is, Does that fire, or does it not, remove more air from a room than an ordinary gas-fire? Professor Cobb will probably add to this question "with equal area of inlet to the chimney." But we question whether a fire could be constructed with an equal area into the chimney without the arrangement in the "injector-ventilating" fire, seeing that it is probable that disadvantageous eddies would be set up. Then Professor Cobb says that "the invitations of the Committee to submit an injector fire for test were not accepted." This is a confession that a fire of the so-called "injector" ventilating type was not experimented with, and in all likelihood there is some good reason why a fire was not sent just at the time the experiments were made—probably owing to the pressure upon gas-fire firms, through munition work, and the difficulty of complying with orders of customers. We need not dissent from Professor Cobb's statement that "the Ventilation Research Committee has made its inquiry into this and other matters, and has reported exactly what was found"—that is to say, under the conditions of the tests. But may we ask whether it is the "reasoned opinion of a *disinterested* body of men" that there should be condemnation by implication of a certain type of fire without that fire itself having been subjected by them to very complete tests?

Professor Cobb's communication does not touch upon the point as to whether we are to assume that the experimental work, with an attachment to an ordinary gas-fire as used at Leeds, is to be taken as showing that the results of the work of Mr. Forshaw and Mr. Farrar which Mr. Yates presented to the British Association in 1915 is unworthy of credence, and that the results found cannot be corroborated. In effect, the veracity of these experimenters is impugned; and not by the results of tests carried out on the actual type of fire with which their investigation was made. The gas profession will no doubt want this matter satisfactorily cleared up.

Enemy Business to be Wound-Up.—An order has been made by the Board of Trade requiring to be wound-up the business of Moffatt, Ross, and Co., Limited, 209, Upper Thames Street, E.C., dealers in incandescent mantles. The Controller appointed is Mr. Walter Boniface, No. 2, Clement's Inn, W.C.

Reminiscent.—Yesterday's "Times" contained the following paragraph extracted from their issue of July 3, 1816.

HOUSE OF COMMONS, TUESDAY, JULY 2.

GASLIGHTS.

On the further consideration of the Lords' amendments to the Gas-Light Bill, Mr. Cawthorne opposed it, particularly as it affected the whale-fishery, and the uncertainty of the machinery to be employed, and the ability of the Company to light the Metropolis. Thirty miles of pipes were requisite; and any accident by the stroke of a small hammer might put a neighbourhood into darkness.

Training of Industrial Chemists.—The Governors of the Huddersfield Technical College, acting with the full approval of the Huddersfield Town Council, are taking steps to provide additional facilities for training industrial chemists. They have decided to establish a new department for specialized study and research in coal-tar colour chemistry (aniline and alizarine dyes). The department has been placed under the direction of Dr. A. E. Everest, now Lecturer in Chemistry at University College, Reading, who has been carrying out a series of important investigations on colours and plant pigments.

LOCAL ADMINISTRATION.

DIVIDED into three parts—public health and local administration, county council administration and the Local Government Act, 1888, and local taxation and valuation—Part III. of the forty-fourth annual report of the Local Government Board has lately made its appearance—the period covered being twelve months ended March 31, 1915.

Under the section relating to local administration, the loans sanctioned to urban and rural authorities are first referred to; it being stated that, of the sum of £9,745,878, the borrowing of which was sanctioned during the year ended March 31, 1915, £8,932,661 was for authorities in England (excluding Monmouthshire), and £813,217 for authorities in Wales and Monmouthshire. Of course, the war did not extend over the whole of this period; and when it did overtake the country, the fear of widespread unemployment led many local authorities to prepare schemes for new works and buildings, in connection with which sanction for loans was secured. Soon, however, it was found that this emergency was not likely to arise; and towards the end of the financial year the Treasury decided to restrict within the narrowest limits capital issues by all local authorities, as well as by companies. So far as local authorities were concerned, it was laid down that no unexercised sanction to a borrowing of money granted by the Board prior to March 12, 1915, should be acted upon without a further sanction; and it was also decided not to sanction the raising of any further money for new expenditure except in cases of pressing necessity, either for reasons of public health or on account of war requirements. The effect of these decisions has been to prevent the raising during the war of a large part of the £9,745,878 already mentioned.

This sum was, of course, sanctioned for a number of different purposes; no less than £1,888,381 being under the Electric Lighting Acts. Under the Public Health Acts and Local Acts, sums of £481,066 for gas-works and £638,037 for water-works were sanctioned; and there is also an amount of £34,305 for costs of obtaining and of opposing Provisional Orders. It is remarked that an examination of the returns as to repayment of loans shows that the repayment has been generally satisfactory. Altogether, nearly 1400 inquiries were held during the year by the Board's engineering and housing inspectors; but as, in consequence of the decision of the Government to restrict the borrowing of money by local authorities until peace returns, the work of these inspectors was for the time being very materially reduced, the services of six of them were offered to the Army Council for the period of the war.

As to Private Bill Legislation, the Board gave their approval under section 4 of the Borough Funds Act, 1872, to the resolutions of 31 town councils and urban district councils, and 3 Metropolitan borough councils, to promote 35 Local Bills in Parliament in the session of 1914, and of 73 town councils and urban district councils, and one Metropolitan borough council, to oppose 44 Local Bills. During 1914, the Board made reports to Parliament on 58 Private Bills, of which 35 were promoted by local authorities, and 23 by companies or other authorities. Under section 303 of the Public Health Act, 1875, there were issued 25 Provisional Orders for the repeal, alteration, and amendment of Local Acts and Provisional Orders Confirmation Acts. Nine of these Orders conferred additional borrowing powers, the exercise of which was in all cases made subject to the Board's sanction. The following are the maximum amounts authorized to be borrowed under the Orders, so far as they relate to gas and water supplies: Birmingham Town Council water undertaking, such sums as may be necessary; Haverfordwest Town Council gas undertaking, £5000; Maryport Urban District Council gas undertaking, £15,000; Southampton Town Council water undertaking, £75,000; and Stafford Town Council gas undertaking, £50,000, and water undertaking, £10,000.

When a rural district council propose to carry out schemes of sewerage or water supply, or other works, the cost of which is chargeable as special expenses, for the common benefit of two or more contributory places, they must apportion the estimated expense, as provided by the Public Health Act; and the overseers of any contributory place, if aggrieved by the apportionment, may appeal against it. In the period under review, the Board issued four orders dealing with appeals of this kind. There were also several complaints, under the same Act, of default by local authorities in the matter of providing their districts with sufficient sewers or with a proper supply of water. In one case, the Board directed a conference, at which one of their inspectors presided; and an agreement to carry out remedial works was arrived at between the local authority and the complainants. Formal inquiries were held in other cases; but further action under the section was rendered unnecessary by the local authorities deciding to carry out the works, and submitting schemes for the purpose. These schemes are being held over until the restrictions on borrowing by local authorities are removed, and the Board are in a position to sanction the necessary loans. Before carrying out sewerage works or laying water-mains beyond the limits of their district, a local authority are required to give certain notices; and if objection is made to the intended works, they may not be commenced without the Board's sanction. During the year orders were made allowing works in several districts, in some cases with and in others without modification. In no case was an order

made disallowing works. For the purpose of providing their district with a proper and sufficient supply of water, a local authority are empowered to purchase (with sanction) any water-works, powers, &c., belonging to a company; and the Board gave their sanction in four cases of this kind. Sanction was also given in fourteen cases to local authorities to supply water throughout an adjoining district.

Notice of the financial portions of the report may be deferred for a week.

FACTORY AND WORKSHOPS REPORT.

An annual report of the Chief Inspector of Factories and Workshops (Sir Arthur Whitelegge, K.C.B., M.D.), for the year 1915, which was issued last week, deals solely with the duties which have arisen in connection with the war. Many inspectors, assistants, and clerks have, of course, joined the forces, and others have been lent to various departments; so that most of the time of those remaining has been given to war emergency matters, not all of which had any direct connection with the Factory Acts.

One thing to occupy attention was the work of the Health of Munition Workers Committee, appointed by the Ministry of Munitions to consider and advise upon questions of industrial fatigue, hours of labour, and other matters affecting the personal health and physical efficiency of employees in munition factories and workshops; another was the Reserved Occupations Committee. The most important part of the work undertaken by the Department, jointly with the Board of Trade, with a view to facilitating recruiting, has been the institution of a number of successful trade conferences to consider what measures of reorganization might be necessary in order to free as many men as possible for national service, and how far the men so released could be replaced by other classes of labour. Inasmuch as the requisite re-organization of labour generally involved the temporary suspension of recognized trade rules and customs, the points calling for settlement chiefly related to the terms and conditions under which such suspension, where possible, should take place.

During the year, the powers of exempting from the ordinary provisions of the Factory Acts any factory or workshop belonging to the Crown, or others in respect of work being done on behalf of the Crown, were extended by the Defence of the Realm Regulations to "any factory or workshop in which the Secretary of State is satisfied that, by reason of the loss of men through enlistment or transference to Government service, or of other circumstances arising out of the present war, exemption is necessary to secure the carrying on of work required in the national interest." In spite, however, of the pressure of work in factories, it is gratifying to learn that there seems to be a more general recognition of the advantages of a week-end rest. There has been no set scheme for the general arrangement of hours when overtime is worked; different systems having been adopted in different localities. It has, however, the report says, been shown that long spells of work without a break are not conducive to good output; and a rule has therefore been established that, so far as protected labour is concerned, the utmost extension of the unbroken spell to be allowed is to be five hours in textile and five-and-a-half hours in non-textile works. Save in the few cases where the normal period of employment is not exceeded, such extension is allowed only on condition that hot refreshment is available in the rooms for the workers during the spell.

The finding of the Health of Munition Workers Committee that, as regards munition works, they "had not found that, as yet, the strain of long hours had caused any serious breakdown among the workers, though many general statements indicative of fatigue had been received," is confirmed by the reports of inspectors from all parts of the country. There can, the Chief Inspector adds, be little doubt that the high wages, and the better food that the workers have been able to enjoy in consequence, have done much to counteract the strain of long hours, and to bring about this result. At the same time, it cannot be said that there are no indications of fatigue of a less serious kind. It has been found impossible to obtain any precise data showing the actual effect of increased hours on production; but the general opinion seems to be that reasonable overtime does yield increased output, though the increase is not in full proportion to the extra hours worked. Reference is made to the great advance in "welfare work" as a most important effect of the war on factory environment; and the obvious need is emphasized for adequate arrangements for meals, especially if long hours or night shifts are being worked. This, of course, is where the gas apparatus manufacturer and the gas supplier have been able to render signal service.

The Chief Inspector, it will be noted without surprise, finds himself unable to give a full list of the processes and trades in which women are now employed; but he does include a table, compiled from recent reports, which indicates the principal work, hitherto confined to men, which is now being performed by women. This he follows up by the remark that women have shown a remarkable adaptability in taking up new duties, and have been specially successful at all kinds of repetition work. This subject, it may be added, is ably dealt with in an appended report by the Principal Lady Inspector of Factories.

THE MECHANICAL HANDLING AND STORING OF MATERIAL.*

The rapidly growing popularity of mechanical appliances for the handling and storing of the various materials used in our great industries, and the many different types of such appliances which are on the markets to meet the requirements of the various trades, have made it virtually impossible for any one individual to remain conversant with all the lines along which this class of labour-saving machinery has been developed, and for some considerable time past there has existed a very real need for a good and comprehensive work on the subject.

This demand has now been met by the book forming the subject of this review; and, in view of the present shortage of labour and of the great industrial war upon which we must eventually enter, it has certainly made its appearance at a singularly opportune time, from the point of view of the engineer, if not from that of the publisher. In the latter connection, Mr. Zimmer may be congratulated on having found a publisher to undertake the floating of so ambitious a work in such abnormal times.

Very few, if any, living engineers are better qualified to write upon this particular subject than is the author, who may safely be accepted as being an authority upon the subject of handling machinery; his life having practically been spent in the study of problems connected with the conveying of materials. The ground covered by the book is an immense one, with which no single person could possibly claim to be *au fait;* and, as pointed out by Mr. Zimmer in the preface, his own varied and essentially practical experience has for the purpose of the book been supplemented by a careful study of those methods and applications which happen to lie outside his experience.

The first portion of the book, under the heading of "Handling," deals with the various and the most modern methods of mechanical transportation, and with the different types of conveyors, elevators, transporters, aerial railways, &c. While the work is comprehensive in every particular, considerable care is expended upon those chapters dealing with the more widely known types of elevators and conveyors, and no pains are spared to make the constructive details perfectly clear. Particular attention has also been given to the methods employed for ensuring a clean delivery of material at the terminal end of the conveyor or elevator as the case may be—a matter of great importance in handling plant designs, neglect of which often has the effect of handicapping otherwise efficient apparatus.

In view of the wide popularity of the type of conveyor manufactured by the Company bearing his name, and with which Mr. Zimmer is associated, we might have been pardoned for anticipating, when taking up the book, that this particular apparatus would be given a comparatively large degree of prominence; but it is gratifying to note that throughout the entire work there is a marked absence of prejudice, the claims of the various types of handling appliances being dealt with in an essentially fair and unbiased manner.

Considerable care is taken in the compilation of tables showing the capacities and the power required for the driving of the various types of apparatus described; but we cannot help thinking that a welcome addition to the work would have been an elaboration of the table shown, on page 143, of the maintenance costs of certain of the more generally known types. This is one of the most valuable tables in the book, and we should like to have seen more of it, as, after all, it is only the experience of one engineer—namely, the late Mr. W. R. Chester, of Nottingham, who obviously had on his works a system of taking out his maintenance costs which we should much like to see in vogue in all the larger gas undertakings. Installation and maintenance costs are data around which a deal of interest centres; and this particular chapter might very well have been extended by the inclusion of a number of examples showing the costs per foot-run of the principal types of conveyors and elevators, together with the maintenance charges incurred in various cases and with varying classes of materials.

There is no lack of information upon the subject of power required; but this also might very well have been supplemented by a statement of the working cost per ton of materials handled on certain selected existing conveyors. In keeping with the general up-to-date character of the work frequent mention is made of the employment of electric power; but no allusion is made to the ease with which this system of power application lends itself to the accurate determination of the power costs per ton dealt with, and, incidentally, to the checking of the condition of the conveyor (or elevator) itself.

Let us, for instance, take the case of a large conveyor driven by an electric motor. A wattmeter connected in the motor circuit will give an accurate record of the number of Board of Trade units consumed over any given period; and the amount of material handled by the conveyor in this time being known, it is

* "The Mechanical Handling and Storing of Material. A Treatise on the Handling and Storing of Material, such as Grain, Coal, Ore, Timber, by Automatic or Semi-Automatic Machinery, together with the Various Accessories used in the Manufacture of Such Plant." By George Frederick Zimmer, Assoc.M.Inst.C.E. With over 1000 Illustrations. London: Crosby Lockwood and Son. [Price 42s. net.]

an easy matter to determine the amount of material handled per unit of electrical energy consumed. Now, so long as the characteristics of the material dealt with, the mechanical efficiency of the driving gear, and the general condition of the conveyor remain the same, so long will this ratio remain unaltered; but any alteration in the factors will cause a corresponding alteration in the ratio, and will thus give an automatic warning that such an alteration has taken place. By this method a close check can be kept upon the general condition and efficiency of any electrically operated conveying plant, particularly if the recording wattmeter be supplemented by a recording instrument which will graphically show all current variations, peak loads, &c., against the time at which they occur.

In the comparatively limited space available for the purposes of reviewing, it is impossible to effectively enumerate the many devices with which this unusually comprehensive work deals. A liberal chapter is devoted to the handling of hot coke on gas-works, while the mono-rail telpher is also given a good chapter. But in view of the extent to which the latter machine has, in the past few years, come to the front in connection with hot-coke handling installations, it would seem a pity that these portions were not arranged to run to a certain extent concurrently. The transportation of hot coke from the mouths of the retorts to the storage heap or bunkers, *viâ* a quenching tank, by means of the mono-rail telpher is a method which has much to commend it; and a few pages might well have been devoted to this application of the telpher, to the conditions which limit its employment for this purpose (having regard to the distance of the storage bunkers from the retort-house), and to the cost per foot-run of such installations.

The mechanical handling of coke on coke-oven plants is a subject to which considerable space is devoted; while a feature that must be of considerable interest to engineers in these times of acute shortage of labour is the portion of the work dealing with the unloading of railway waggons by means of mechanical tipping devices.

In connection with band conveyors, it will come as a welcome surprise to many engineers to learn that steel bands are being employed with a large degree of success in lieu of the old material and rubber-treated belts with which we are so familiar.

It seems rather a pity that no mention is made of the special attachment chains which have been evolved from the standard block-driving chains, and which have a wide variety of applications for the transportation of small articles.

Great attention is given to the many types of pneumatically and hydraulically operated dockside appliances for the unloading of steamers, barges, &c., to the storage of materials, and to the methods in vogue to prevent spontaneous combustion; and the volume fittingly concludes with a description of the most modern methods of automatically recording the weight of materials.

In ambitious works of this discription it not infrequently happens that the complete volume gives one the impression of an elaborate and comprehensive trade catalogue; but so far as the present work is concerned, this is a fault of which Mr. Zimmer has steered clear. Altogether we have in Mr. Zimmer's treatise a good book by a good man, a compilation which can only enhance the author's already fine reputation as an authority on the mechanical transportation of materials, written in a plain, concise form which must appeal to all who are fortunate to include the work in their library. It should find a place in the collection of every engineer who is responsible for the design or operation of large transportation plants, while it is likely to prove of the greatest value to those engineers of comparatively small undertakings who, faced with the necessity of extending or modernizing their works' plant, find themselves largely in the hands of the contractors when the question of the most suitable type of handling plant comes up for discussion.

The book is well, even profusely, illustrated; over a thousand illustrations and drawings being embodied in the volume.

GRADING OF TAR AND PITCH FOR ROAD USE.*

The "Practical Guide for Engineers and Surveyors" on the "Testing of Tars and Pitches for Roads" which is now before us is not—as the title-page might suggest—a large treatise, but a modest pamphlet of sixteen pages, selling at 1s. 6d. net. Nevertheless, the contents thoroughly warrant the qualification "practical," for they comprise descriptions of simple, trustworthy pieces of apparatus and their use for determining the specific gravity, viscosity, volatility, and flash and burning points of tars, and the specific gravity, penetration, melting-point, and ductility of pitches. The apparatus in each case is that suggested as suitable for the use of surveyors and their assistants in the Road Board specifications for tars and pitch, or, where no such official suggestion is available, is based upon the proposals of leading British and American road engineers.

The apparatus and methods described should be very useful in the many gas-works which are now dehydrating tar for road use, as well as in tar distilleries where both pitch and tar are prepared to meet the requirements of the Road Board and County and Borough Surveyors. The tests described do not supplant the chemical examination on which a decision as to the ultimate serviceability of the materials must rest, and by which the particular deficiencies of a faulty batch must be ascertained with a view to their subsequent elimination. They do, however, place in the hands of any intelligent person who may have the supervision of the production, delivery, or use of road tars and pitches ready means of checking the more essential qualities of these products, and thereby preventing mistakes which have been too frequent in the past, and have been costly to all concerned.

Mr. Hutchinson has great faith in the wide scope for the employment of coal tar and pitch in road construction in this country. In the "Introduction" to his pamphlet he says:

> "Coal tar and its pitches are specially adapted to British climatic conditions in connection with road work. There are no great summer heats or very low temperatures to contend with. The long periods of continuous rainfall which sometimes occur have but little damaging effect on them, to which is due the valuable power they possess of resisting moisture. Unquestionably these materials, of such proved value in modern road-making, are worthy of the utmost care and attention to detail no less on the part of the engineer in specifying them and testing their suitability than on the part of the manufacturer whose co-operation is so essential to success."

These words, coming from the pen of an acknowledged authority on asphalt, are a gratifying testimony to the valuable characteristics of coal tar and pitch.

Mr. Hutchinson's reminder that co-operation on the part of the manufacturers of road tars and pitches is essential to success is timely. An impression prevails very widely among gas-works engineers that the provision of a tar-dehydrating plant is all that is necessary to ensure the production of good road tar. In every case, however, this plant needs intelligent supervision, and careful control of its working, according to the results of regular tests of the product, if satisfaction is to be constantly given to the purchaser and user. In some cases the character of the crude tar does not admit of the production of a high-grade road tar, unless blending with tar from other sources, or segregation of the tar condensed in certain parts of the works train of apparatus, is resorted to.

In these respects a gas-works engineer is obviously at a disadvantage in competing with the tar distillers and manufacturers of proprietary road tars, who draw their supplies of crude tar from a variety of works, and have the benefit of many years' experience in the grading and blending of tars. On the other hand, the gas-works often have the advantage of being the nearest source of supply; and, if properly advised, the gas engineer may, with reasonable care in the supervision of his dehydrating plant, consequently secure the bulk of the orders which the local road authorities have to place for tar. It may be anticipated that shortly after peace is declared there will be a large amount of reconstructing and renovating work on the roads—now somewhat neglected—throughout the country; and suitable grades of tar will then be required in large quantities for this work.

* "Testing of Tars and Pitches for Roads." "A Practical Guide for Engineers and Surveyors, with Methods for Determining Some Physical Properties of Stone," by John Hutchinson. Published by the Author at 11, Tothill Street, Westminster.

INDUSTRIAL GASES.*

One of a series of manuals of chemical technology edited by Mr. Geoffrey Martin, Ph.D., D.Sc., deals with the subject of gases of industrial importance—not, of course, in full detail, but with such conciseness as is called for by the breadth of the title. With so many widely separated processes to describe, the preparation of the different chapters has of necessity been left in the hands of various writers; and no doubt the book itself is intended to be of service to those who desire to know something about many matters rather than all there is to be learned concerning one subject. For instance, the illuminating gas industry—coal gas, carburetted water gas, oil gas, air gas, and natural gas—has no more than twelve pages devoted to it; while about one-half this space is allotted to acetylene.

In saying this, however, we would draw attention to the claim of the Editor that there have been collected together in these chapters a great many facts which have never before appeared in book form, and that there will be found there a lot of data which previously were either hidden away in "the often inaccessible pages of a scattered chemical literature or buried away in patents." At the head of each section, there is a list of references to some of the literature on the particular subject dealt with therein; and, in the case of the liquefaction of gases, this is followed by the names, numbers, and years of the principal English, French, and German patents relating to the systems described. The patent literature of the book has, in fact, generally been made as complete as possible, in recognition of the truth of the Editor's remark that "many patents, though impracticable, often contain the germs of valuable ideas."

For the chapter (the first in the book) on the liquefaction of gases—including the manufacture of oxygen, nitrogen, and hydro-

* "Industrial Gases, including the Liquefaction of Gases," by Geoffrey Martin, D.Sc. Ph.D., F.C.S., and others. London: Crosby Lockwood and Son. Price 7s. 6d., net cash.

gen from liquefied gases—Mr. John M. Dickson, B.Sc., has been responsible; while the matter referring to industrial oxygen, industrial nitrogen, the manufacture of nitrous oxide, the ammonia and ammonium salts industry, and the manufacture of sulphur dioxide and sulphites has been compiled by Dr. Martin. Mr. H. Stanley Redgrove, B.Sc., F.C.S., deals with hydrogen, producer gas, and the carbon dioxide industry; Mr. Frank B. Gatehouse, F.C.S., with acetylene; Mr. Ernest A. Dancaster, B.Sc., with the illuminating gas industry; and Mr. E. Jobling, A.R.C.Sc., B.Sc., F.C.S., with industrial ozone. There are a number of illustrations in the text, and several plates; and with regard to one or two of these, as the Editor asks for suggestions for future editions of the book, we would venture to point out that re-writing of the explanatory lines of the diagrams on a little larger scale would make them decidedly easier to follow. This is, of course, neither an "error" nor an "omission"—which is what the Editor asks to have his attention drawn to; it is merely a question of smoothing the path of the reader.

Some space is devoted to an illustrated description of Haber and Le Rossignol's process for the preparation of synthetic ammonia; and systems for the production of ammonia from cyanamide and from nitrides are similarly dealt with. In describing the purification of coal gas, the author says that a complete set of purifiers consists of eight vessels arranged in four pairs; and, as usually arranged, the first pair are charged with slaked lime, and the third pair with sulphided lime. Then lower down, in the smaller type in which very much of the letterpress is printed, it is added that "frequently the sulphided lime vessels are left out, and sometimes the purification of the gas after leaving the washer-scrubbers is limited to passage through hydrated ferric oxide only, or through slaked lime alone." Apart from the suggestion of disconnectedness which is really conveyed by the use throughout the book alternately of large and small type, it may be thought that in this particular case full justice is hardly done to the present-day prevalence of purification by oxide only in gas-works practice. For the next edition, too, it may be pointed out that on the present occasion in one or two cases proper names are not correctly spelt. Such small matters as these, however, may not affect the usefulness of the book for the purpose which it is intended to serve.

THERMAL PROBLEMS FOR GAS ENGINEERS.

I.

By Norton H. Humphrys, Assoc. M. Inst.C.E., F.C.S.

In view of the extent to which heat reactions are concerned in connection with the primary operations at every gas-works, it is surprising that the thermal problems incidental to the manufacture and combustion of gas and of coke have attracted but little attention, especially as the fact is a matter of common knowledge that a very substantial proportion of heat generated in the first place by the combustion of coke or other fuel goes to waste—and serves no useful purpose—by way of the flues or chimneys, by radiation and convection from the exterior surface of retort-settings, generators, boilers, &c., from foul mains, condensers, and coolers specially designed for the purpose of dissipating or getting rid of surplus heat, and by the douching of incandescent coke with cold water. The regenerator type of furnace, and the superheater through which the incoming oil or water are passed before entering the carbonizer or the boiler, represent the only general methods in use for turning a portion of such waste heat to practical account; and a few isolated endeavours have been made in the direction of placing tubular boilers in the main flue between the outlet from the retort-furnaces and the chimney.

Up to the present time, there has been no special inducement towards the economization of heat. Many gas engineers, if invited to consider the subject, would say that, in the event of increasing their production of coke, they would be compelled to get rid of the surplus at a low price. An ample supply of screenings, pan breeze, and such-like almost valueless fuel material has always been available for raising steam. Other matters of more importance have crowded-out questions relating to economy of heat. A new aspect has, however, come into existence in regard to thermal problems, by the introduction into commercial politics, of considerations of a patriotic character, leading to a fuller realization of the relations between foreign competition and our national security and prosperity, and the necessity of economizing our national resources—frequently preached, but as yet seldom practised. But the necessity for economy in every direction, which daily increases in importance, will probably lead to more serious and closer examination of matters connected with the more complete utilization of heat.

Until within the last two years, a wasteful consumption of fuel was considered to affect no one other than the owner. Gas engineers were accustomed to discuss it entirely as an individual matter; but since the outbreak of war, the needs of their country strongly colour the whole of their proceedings. Previously they had supposed that the scope of their duties to their employers and the public lay within the limits of selling a good honest article at a fair price according to circumstances, and paying the full dividends allowed by law. Now they take a much wider view. They had hitherto regarded foreign competition in a casual way, as a sort of friendly rivalry that might be tolerated or even encouraged. But recent events have stripped away all sophistry, and revealed the fact that it is capable of being applied as a skilfully arranged and relentless attack, extending much further than commercial prestige or financial prosperity.

We have also to consider the enormous and repeated advances in the cost of coal in common with all other materials, and of labour, both of which have now reached record prices. Not only is there no prospect of any immediate relief, but we have to face the probability of a partial failure of supplies, or scarcity at any price. So that the cost of producing heat for any technical process will be greater all along the line for many years. Economy of fuel in the retort or boiler house means, among other things, a corresponding reduction in respect to clinkering and heavy labour, in respect to which the removal of nearly all men of military age is more keenly felt than in any other department. There are few gas engineers who would not thankfully welcome a 20 per cent. or even a 10 per cent. reduction in heavy labour, for reasons outside the bare financial consideration.

A few general investigations into the subject of heat reactions, now usually called "thermo-chemistry," concerned in the principal operations peculiar to the gas industry are consequently not out of place; and they are offered rather in the way of preliminary examinations that require to be substantiated by further experiment and inquiry than as full and accurate conclusions. In some instances complete data are not available, and in others the ground work is of a debatable character.

The "A.B.C." of Thermo-Chemistry.

Any action or process that involves change of composition as revealed by chemical analysis, a tangible physical change (not necessarily attended by an alteration in composition), as when a solid or liquid is converted into a gas, or even an intangible molecular change, such as may attend the actions of solution, expansion, or contraction—has its special heat action. It involves either absorption or evolution of heat, and is accordingly said to be "endothermic" or "exothermic," as the case may be. An alteration in bulk, unattended by other change, is always accompanied by influx or eflux of heat. Every operation included in analysis, synthesis, metamorphoses, substitution, destructive or fractional distillation, evaporation, compression, or expansion is attended with heat action, and the same, like calorific value, specific gravity, specific heat, and other properties, is constant. In operations of a compound or complex character, both exothermic and endothermic actions may be concerned. Heat changes of an extensive kind may possibly occur; but those of one sort may nearly balance those of the other, and the apparent or net result may be small. The production of blue water gas by the action of superheated steam upon incandescent carbon is an example. The final reaction is usually written as:

$$H_2O + C = H_2 + CO,$$

which is equivalent to 18 lbs. H_2O + 12 lbs. C = 2 lbs. H + 28 lbs. CO. The heat absorbed by the decomposition of the water into the elements of which it is composed is about the same as that evolved by the combination of the C and O; so the two reactions practically balance each other, and the net or apparent result is *nil*. It is similar to paying one customer £5 in business, and receiving £5 from another—the cash balance remains just as before.

It is convenient for practical purposes to talk about efflux and influx of heat. We must not, however, lose sight of the fact that heat is not a form of matter, but of force or energy. Just as, under certain conditions, the properties of a gas resemble those of a liquid, so heat, in some respects, may at times behave as a form of matter. This is no doubt the origin of the phlogiston theory held by the ancient alchemists, who regarded fire as an element of matter. That a heat reaction is "constant" may be regarded as the first axiom in thermal science; that it is reversible, is the second. If water can be divided into its elements, it can, under suitable environments, be united to form water, and such re-union will be attended by the evolution of exactly as much heat as was absorbed by the first action. Heat absorbed may conveniently be indicated as +, and heat evolved as −. So that the heat effect of one reaction can be made to indicate the reverse by simply changing the sign. A pound of water at 212° converted into steam of a similar temperature absorbs a certain quantity of heat, which may be called x; and the heat given out by the conversion of the steam into its original form will be $-x$.

The distillation of alcohol or other volatile liquid in a retort means that a certain amount of heat is absorbed in the retort in doing the work of converting the liquid into vapour, and that a similar amount of heat is evolved in the act of re-converting the vapour into a liquid in the condenser. Hence we apply a source of heat, such as a bunsen burner, to the retort, and cold water or ice to the condenser. If the heat absorbed in the retort is y, that given out in the condenser is $-y$. So far as we know, given an absolutely pure substance, such actions may be repeated indefinitely without affecting the result. As a general rule, the actions of analysis are all +. [Taking apart, example $H_2O = H_2 + O$.] And those of synthesis are −. [Joining together, example $H_2 + O = H_2O$.] Interchange or substitution may be $a + a -$, or a combination of both. [Example, $H_2O + C = H_2 + CO$.] The change from a solid to a liquid or a liquid to a gas is +, and the reverse is −. Distillation and evaporation are therefore +, and condensation is −. The expansion of a gas is +, and the contraction is −. Solution may be + or −. The addition of

calcium chloride or ammonium nitrate to water are well known examples of the first class, and of hydrogen sulphate to water of the second. Most of the substances that show a high heat reaction on solution are deliquescent, and absorb water rapidly on exposure to the atmosphere. The compression, cooling, and subsequent expansion of air furnishes the most practicable method of producing artificial ice or cold.

There are notable exceptions to certain of these rules; and the study of thermo-chemistry will generally be found to furnish some curious coincidences and equally unaccountable exceptions. The facts that ice is lighter than water and that the conversion of solid C to the gaseous CO or CO_2 are specially interesting examples. Such descriptions as "explosive," "combustible," or "non-combustible" have no definite signification, but are simply convenient colloquial terms indicating the nature or character of exothermic action. If a large amount of heat is liberated within an infinitesimal period and the action completed within a small fraction of a second, we get the effects known as "explosive." A more prolonged reaction, extended over some minutes or hours, but developing a sufficient degree of energy to maintain a visible heat or flame, is said to be combustible. If the reaction is so slow as to extend over several months or years, and the evolution of heat at any one time is so slight as to be imperceptible to the senses, the substance is called "incombustible." Just as a substance may exist in the form of a solid, a liquid, or a gas, so it may conform to either of the conditions known as "explosive," "combustible," or "non-combustible," according to physical conditions and environment. If a piece of iron in the form of thin wire is exposed to the atmosphere, it is incombustible, but in the course of some considerable period of time is converted into Fe_2O_3. If, however, it is introduced into the flame of burning hydrogen gas, it is decidedly combustible.

Assuming the chemical reactions to be the same, the quantity of heat produced will be the same in each case. Obtain the same weight of iron in a finely-divided condition, which may be done by decomposing an inorganic salt of the metal in a closed vessel by means of heat, and it is spontaneously combustible; becoming incandescent on exposure to the air. A sheet of dry paper, tightly rolled, only scorches on the outside when exposed to flame. But tear the same paper into small fragments, pile them loosely, and they ignite with energy, producing a large and powerful flame. A block of coal is ignited with some difficulty, and suitable arrangements as to draught and air supply are necessary before we can secure its complete combustion. But grind the coal into very fine powder, and diffuse it through the atmosphere, and it will be so rapidly inflammable as to be explosive. Usually the power of combustion follows the rule—solid, liquid, gas, as the act of combustion involves conversion into the gaseous form; and a combustible gas or finely-divided solid or liquid, mixed with an appropriate quantity of air, is explosive.

Gas engineers are largely interested in "combustible" matters, and all knowledge respecting the relative calorific value of different substances originates from, and is based upon, experiments conducted with the aid of a calorimeter. This class of instrument has now been so improved in construction that the ascertaining of calorific values to a degree sufficiently accurate for all ordinary practical purposes is a comparatively simple matter, and the results can be calculated to any convenient standard of weight or of measure. The values of elementary substances having been ascertained and agreed upon, the value of mechanical mixtures, or of chemical compounds composed of such elements, can be arrived at by simple proportionate calculation; but such calculations do not take account of the decomposition and interaction that may occur during the act of combustion, and, although useful for some purposes, the actual test by the calorimeter is preferable. But sometimes only a small quantity of the sample is available. It is easy to send a few cubic inches of gas, sufficient for a burette analysis, a distance of a hundred or two miles; and as this quantity is no use for an ordinary calorimeter test, a close approximate value can be calculated from the results of analysis by an experienced operator.

(To be continued.)

Sulphur Impurities in Coal Gas.—Referring to the paper that Professor Clowes read before the Society of Chemical Industry [JOURNAL, May 9, p. 279], a correspondent of the "Chemist and Druggist" points out that in the discussion there was much talk about sulphurous acid and sulphuretted hydrogen, but no direct reference to sulphuric acid. If coal gas of ordinary quality, he points out, be burned in a bunsen burner over which a bell-glass is suspended, and the glass rinsed with distilled water, the water will be found to give a strong reaction for sulphuric acid. It is this sulphuric acid which does the mischief, and not the sulphurous acid. Sulphurous acid may be objectionable on hygienic grounds, and by condensing with moisture on surfaces in a room will be partly oxidized to sulphuric acid; but it is the sulphuric acid formed in the bunsen flame which corrodes the water-baths and destroys the brass fittings of incandescent burners. One may also point out, he continues, that there is no proper comparison between sulphur compounds given off by burning coal in a grate and sulphur compounds in gas burned in a confined space, such as a room. In the former case the gases produced from the burning coal mostly pass up the chimney, and the conditions favourable to oxidation of SO_2 are infinitely less than in a bunsen burner.

CALORIFIC VALUE CONDITIONS IN THE UNITED STATES.

This question is dealt with in the course of the report of the Public Relations Committee of the American Gas Institute. It is pointed out that so far no word has been received of any action in regard to the Massachusetts Bill No. 241, which will permit the State Commission to undertake an investigation of the manufacture of gas on the heating value basis by the gas companies under their control. As far as the Committee have been able to learn, however, the Bill in all probability will be approved.

In an article published on May 8, in the "American Gaslight Journal," it was noted that the Public Utilities Commission of the State of New Jersey had dismissed the complaint of the City of Trenton requiring the Public Service Gas Company in that city to return to a 22-candle power standard. The order states that gas supplied under the present rules and regulations of the Commission, calling for a heating value of 600 B.Th.U. (with a minimum which will not fall below 550 B.Th.U.) is to be considered as giving adequate service as far as the heating value of the gas is concerned, and states that the illuminating value under the present methods of manufacture cannot fall much below 16-candle power.

No action had been taken in regard to the resolution suggested by the National Commercial Gas Association, concerning the adoption by the Institute of a recommendation calling for a British thermal unit standard for gas supplied. As this matter has been referred to the Public Relations Committee, it is proposed to appoint a Sub-Committee to take action upon it before the annual meeting.

In several of the larger cities in America the matter concerning the supply of gas upon a heating value basis is under consideration. In the City of New York hearings were at the date of the report taking place that might result in some future action being considered.

In Chicago the local Company has made a proposition to the City Council, submitting a new rate schedule providing that the illuminating value standard be replaced by a heating value standard. The local Company was bringing the matter before the general public through a series of advertisements that ran in the daily papers for some weeks.

The article in our American contemporary referred to above, after setting out at great length the decision arrived at, was to the following effect:

The complaints concerning poor service in Trenton naturally have some foundation. Trenton is not a new city; some portions of it are as old as any in the State. Many of its houses were piped for gas long before gas was used as extensively as it is to-day, and when the importance of ample-sized piping was not realized. Furthermore, gas piping becomes clogged with materials which interfere with the passage of the gas.

The growth in the use of the gas for heating has been so great in the past twenty years as to change the conditions under which gas is consumed. As a result, we find to-day that the gas used because of its heating value, ranges somewhere between 80 and 90 per cent. To impose upon the users of 80 per cent. of gas an increased burden, due to an increased cost of manufacture amounting to from 8 c. to 15 c. per 1000 cubic feet, would be unjust and unreasonable—especially when there are satisfactory substitutes for the flat-flame burner, which result in very large savings to those who use gas for illumination.

This is borne out by a statement in a report by the Director of Public Works of the City of Philadelphia, on the cost of producing illuminating gas in American cities. He states:

"Since, undoubtedly, in excess of 75 per cent. of all the gas now used is for purposes where a calorific value is the only essential, comparisons are justified, though a survival of the candle power standard in some places has an influence in causing the retention of somewhat more costly methods of manufacture than are really desirable."

Last year the City of Trenton filed a complaint with the New Jersey Board of Public Utility Commissioners, alleging that numerous complaints had been made to the Board of Commissioners respecting the poor and insufficient illuminating power of the gas furnished by the Public Service Gas Company, and praying the Board to increase the standard of gas for illuminating purposes. The city admitted that the illuminating power of the gas was at least equal to the standard fixed by section 18 of "Compiled Statutes;" but as the standard was established many years ago—to wit, during the year 1877—it was practical and entirely reasonable to require the furnishing of gas of a greater illuminating power than the existing standard.

The answer of the Company to the complaint denied that it was furnishing a poor and insufficient illuminating power of gas to Trenton, or that the complainant had any cause for complaint in respect to the gas furnished; insisted that the gas was equal to the standard fixed by their Act, and also equal to, and in excess of, a standard fixed by the Public Utility Commission; and denied that a candle-power standard was either practicable or reasonable under existing conditions—as since the introduction of gas-mantles

the important element in connection with illuminating gas was the heating power.

The Company insisted that the overwhelmingly larger proportion of gas is used in devices in which heat units play a more important part than illuminating power, and that the greatest good to the greatest number of users requires that a heat-unit standard, and not a candle-power standard, should be fixed for gas. They also denied that there was among customers in Trenton general dissatisfaction with the gas supplied. It supported this contention by stating that with its October accounts notices had been sent to its 11,000 customers in Trenton, in the form of a return post card, asking each one to send in answers to various questions regarding the service. In response to the 12,000 notices, only 220 replies were received, and analysis of these did not indicate that there was cause for complaint.

It is the practice of gas companies (and the Public Service Gas Company is no exception) to keep permanently employed a number of fitters to, without charge, make adjustments, in order that the customers may obtain the best service from the burners and appliances they have in use. The Board believes that the Company ought to systematically call the attention of customers who use gas for illumination to the modern appliances for illumination by gas, give information as to where these articles may be obtained, and call attention also to the Company's practice with regard to care and inspection of customers' equipments.

The Company's system of keeping record of complaints does not appear to be lacking; and testimony shows that complaints have been followed up with a reasonable degree of promptness. The attention of the public is called to the fact that one of the Board's rules requires that the gas companies keep records of all complaints, showing the nature of the complaint, the time it was received, the time it was remedied, and the nature of the remedy. Because of a large number of older houses in Trenton, it is quite certain that many of the complaints of poor service arise from insufficient or clogged piping; and where customers are suffering from poor service, the attention of the Company should be requested to inspect the premises to determine whether the remedy lies in the renewal of a service pipe or in the renewal or overhauling of the house pipes.

The Company's duty, as the Board sees it, extends:

1. To the production of a commodity having a certain purity and certain value with regard to heat units and illuminating value, which illuminating value, under present methods of manufacture, cannot fall much below 16-candle power.
2. Gas must be delivered as far as the outlet side of the meter under such conditions with regard to pressure as to enable the efficient and satisfactory use of the gas.
3. Gas must be measured correctly.
4. The measurements as indicated on correct meters must be clearly set out on the bills sent to customers.

If a gas company fulfils these requirements, and deals with its customers in accordance with reasonable rules and regulations, adequate and proper service will be provided. These general rules of practice, however, ought, in the Board's opinion, to include a sufficient amount of educational advertising as will enable customers to make the most efficient and economical use of the product the gas company sells.

The result of the case is thus stated: "With the above recommendations, which affect both the customers and the Company, the complaint will be dismissed."

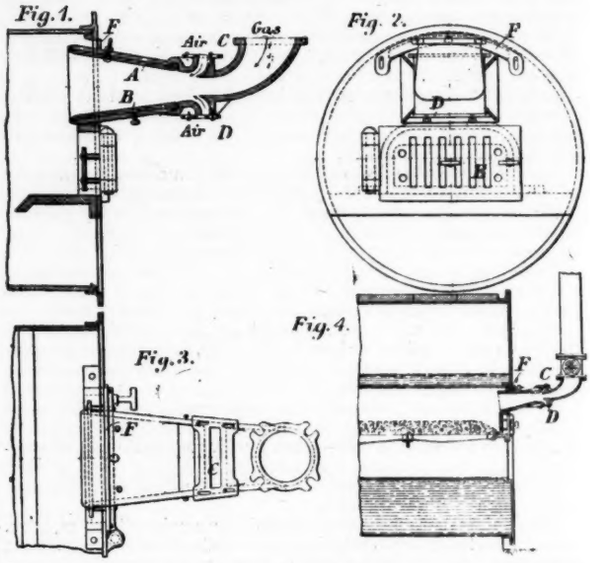
The Next Meeting of the American Gas Institute.—At their meeting last month, the Board of Directors of the American Gas Institute had submitted to them a tentative programme of the October meeting, which, after discussion, was adopted, leaving the Committee on Arrangements and the Technical Committee free to vary the details. As this programme if carried out required an additional day, it was voted to hold the meeting on the third Tuesday (instead of the third Wednesday) of October.

Sulphate Plant for Small Gas-Works.—Among the abstracts published in the last issue of the "Journal of the Society of Chemical Industry" is one of an article appearing in No. 19 of the "Journal of Chemical Industry of Tokio, Japan," and written by Mr. K. Fukuda. The plant described (designed by the author) has been installed at several small gas-works in Japan. It consists of a preheater, a superheater, a still, a trap-box or separator, a syphon pot, a saturator, an overhead gas-liquor tank, and an overhead liming-tank. The still is a rectangular horizontal box provided with a large number of trays formed of wide gas-pipes and arranged in steps. It is set in the flue between the retort furnace and the chimney; and the ammoniacal liquor is run into the still through the preheater and superheater. The superheater is placed in the lower part and the preheater in the upper part of the still. When using ammoniacal liquor of low strength (0·77 Twaddel at 60° Fahr., equivalent to 0·25 to 0·30 per cent. of NH_3), the ammonium sulphate crystals form slowly, and only require removal at intervals from the fishing-pocket of the saturator. The experimental results obtained with the plant at the Matsumoto Gas-Works are as follows: The efficiency of the still is 96·23 per cent.; the yield from 100 gallons of gas liquor being 22·9 lbs. of ammonium sulphate, as compared with 23·8 lbs. by calculation. The sulphate produced contained 24·67 per cent. of NH_3. The total cost of operating the plant, per 100 lbs. of ammonium sulphate, is 4s. 7d.

BURNER FOR SIMULTANEOUS GAS AND COAL FIRING.

The following article and the accompanying illustrations are reproduced from "Engineering" for June 23.

The illustrations show a burner for the combustion of gas in steam-boilers, designed by Mr. T. M. Hunter and constructed by the Power Gas Economy Company, of Glasgow—a firm of which Mr. Hunter is now the sole partner. The arrangement is that adopted for the simultaneous use of coal and gas firing in a Lancashire boiler; the fire-grate with dead-plate and fire-door being retained. The gas enters at the point shown (fig. 1), and passes into the mixing-chamber, carrying with it the necessary air for its combustion—this latter entering by the apertures at C and D, which can be adjusted by regulating plates (figs. 1 and 3). However, as the air current is largely induced by the gas current, there is naturally an automatic adjustment which adapts the supply of air to the varying gas pressures. The mixing-chamber is rectangular in cross-section, and contains two adjustable flaps A and B, which can be moved nearer together, or further apart, to obtain the best mixture of the air and gas.



The burner may, as shown, be used in connection with coal-firing, and is particularly useful in simultaneous employment with fuel of poor quality (fig. 4). In these circumstances, secondary air is admitted by the air inlets E in the fire-door. Secondary air is also admitted above and on both sides of the burner by an opening covered by a plate F, about 2 inches wide, which extends across the top of the burner and down the two sides, and is hinged on each side. This plate is adjusted in position by a rod and set-screw, as shown in fig. 4. It is claimed that with this burner an efficiency of 70 per cent. can be obtained with gas-firing in Lancashire boilers.

PREVENTING POLLUTION BY GAS-WORKS.

Means that can be taken for avoiding the objectionable results which may arise from unpurified waste liquids from gas-works being allowed to discharge into sewers and water courses were described by Mr. Paul Hansen, in a paper which he presented to the Illinois Gas Association.

The first step, he said, in eliminating nuisance due to gas wastes is to reduce the volume of the wastes to a minimum, and keep them well confined in channels and tanks. The volume of wastes should be kept down by re-using water after sedimentation in seal-pots, and wherever else permissible, and by a strict separation of rain water drainage and wastes. This is particularly necessary in connection with gasholders. The overflow from gasholder seals is responsible for many cases of stream pollution.

After the volume of the wastes has been reduced to a minimum, which may be taken as 10,000 gallons per million cubic feet of water gas, and about 6000 gallons per million feet of coal gas, the wastes should be treated for the recovery of tar. This is usually accomplished by the use of tar-reservoirs. These reservoirs should be of liberal size, not only to promote a good separation of tar and oil from the liquid, but also to equalize sudden discharges. A tank capable of holding several days' supply is desirable. The effectiveness of the tank may be increased by suitable placing of baffles, to secure complete displacement by the liquid passing from the inlet to the outlet, and also by heating the tank with steam-coils. Very substantial concrete construction is desirable, so as to prevent the passage of liquids and tarry matter into the soil.

The effluent from the tar-tank should next be treated with a

coagulant. Say, 90 per cent. lime in proportion of 3 or 4 lbs. per 1000 gallons of waste treated is adequate for wastes from coal-gas plants; but water-gas wastes require coagulation with both copperas and lime, to prove effective. Generally, 2 lbs. of copperas per 1000 gallons of waste is sufficient.

Correct preparation, storage, and application of chemicals are very important items. The lime must be slaked in a suitable slaking-box, and the hydrated lime thus obtained must be diluted to form a thin milk of lime (not over 5 per cent. in strength), in order to prevent, as far as possible, clogging of pipes, valves, and orifices. The milk of lime should be placed in a storage tank of suitable capacity, provided with a stirring-device kept constantly in operation, to secure a uniform suspension of lime particles. Uniform application is secured by means of a small feed tank, in which a constant level of water is maintained by a float-operated inlet-valve, and from which the chemical flows through a sharp-edged orifice that should be made adjustable in size. Suitable feed-boxes may be obtained, or they may, with comparative ease, be specially designed and built. The copperas is stored and fed in the same manner as the milk of lime; but, being readily soluble, no stirring-device is necessary. A convenient way of preparing a copperas solution is to place the crystals in a shallow box with perforated bottom, built in the side of the storage tank near the top, and spray water over the crystals until they are dissolved. A 5 per cent. solution is of convenient strength. To insure an intimate mixture and complete reaction of the chemicals with the wastes being treated, a highly-baffled reaction chamber, with a retention period of about 15 minutes, is desirable.

Following coagulation, the wastes should be permitted to settle for a period of at least an hour. Rectangular tanks, with a length about three times the width and a depth of 5 or 6 feet, are best adapted to this purpose. It is always well to have the sedimentation tanks in duplicate, so that one may be taken out of service when cleaning without disturbing regular operation. The tanks must, of course, be provided with suitable means for tar removal. As a means for intercepting oil, a coarse coke-strainer should be placed at the outlet of the sedimentation tanks. This can most readily be accomplished by building a shallow box with a perforated bottom across the end of the tank, about 9 inches below the invert of the overflow channel, and 2 or 3 feet in width. The inner edge of the box should project above the level of the liquid in the tank. The box should be filled with nut-sized coke, through which the wastes may pass in an upward direction. When the coke becomes clogged or saturated with oil, it may readily be shovelled out and replaced with fresh coke. The used coke can, of course, be burned under the boilers. Very often the treatment outlined will prove all that is necessary; but the effluent will still have some odour, colour, and turbidity, and perhaps there may be traces of oil. Nevertheless, it should not prove seriously objectionable if discharged into city sewers or into a stream of considerable size.

There are many cases, however, where a higher purification is necessary; and this is very apt to be true in the smaller plants where little or no attempt is made to recover the valuable bye-products, such as the tar and ammonia. In such circumstances, final downward filtration through a bed of fine coke will produce an effluent so free from objectionable matters that it may be discharged into even the smallest watercourses without giving rise to offensive conditions. Sand can be used quite as effectively as coke; but the coke has the advantage about gas plants of availability and of being usable under the boilers after it becomes clogged. Suitable sand is not always available; and after removal from the filters it must be permitted to accumulate in unsightly heaps or be disposed of at considerable expense.

The filter-beds should be made 3 feet or more in depth, of material not coarser than ¼ inch in diameter, and free from fine dust. The area of the surface of the filter should be such that the rate of filtration will be about 1,000,000 gallons per acre per day, or roughly a gallon per square foot per hour. Under-drains of vitrified tile laid with open joints should be placed across the bottom of the filters, at intervals not greater than 10 feet. To prevent clogging of the drains, the joints should be covered with cheese-cloth, and the tile surrounded with gravel.

The surface of the filter must be kept level, and it should be, if possible, 4 or 5 feet below the level of the outlet of the sedimentation basin, so as to permit this head of water on the filters before cleaning becomes necessary. When the filters become so clogged that water will not pass through them under the head available, the surface of the filter must be removed. Generally, the removal of only a few inches of material will be necessary, as the clogging will take place principally at the surface. After successive scrapings have reduced the thickness of the filters to about 18 inches, there should be a deep scraping of at least 6 inches, and the new material should be placed to the original depth. Occasionally, it may be necessary to remove all the filtering material.

Gas-works waste can generally be treated so as to overcome its offensiveness in a simple manner and at moderate cost. The problem at different gas plants unavoidably varies according to local practice; and in important cases it would be desirable, before expending any considerable sum on treatment works, to secure the advice of one who has given special study to the purification of sewage and industrial wastes.

Contraband of War.—By a Royal Proclamation dated last Tuesday, asphalt, bitumen, pitch, and tar are declared absolute contraband of war.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

"The Will o' the Wisp" of Uncarburetted Hydrogen.

SIR,—I wonder whether the first gentleman who ever sanded his sugar laid the flattering unction to his conscience that he was doing it in "the national interest?"

Many years ago, when the Germans were busily engaged in killing off the large British industry of sugar growing and refining (helped by a Government which made them a substantial present on each ton they put out of action), it may have occurred to some patriotic sugar-sander that as sweetening material was used by the spoonful (and sand was very plentiful), he would be helping the conservation of the national sugar resources by substantial additions of a diluent. Under such circumstances he might very possibly have considered that patriotism was entitled to override honesty, so to speak; and if while doing his bit he made a bit, well! surely no one could think of blaming him for that. He was out to help his country; and it was no concern of his if other people were out-of-pocket by the process. It probably never occurred to him that for his British Demerara some day might be substituted enemy grown beet, or that his customers, too contumacious to complain, might transfer their favours to other purveyors whose produce, though dearer, maintained its standard quality.

If, however, he was so injudicious as to choose war time to try his experiments on the public swallow, is it not possible that his patriotism might be regarded dubiously, and that his *undiscounted* returns in coin might be regarded as accumulating dishonesty?

There seems to be just now an epidemic of the "sugar sanding" impulse, encouraged perhaps by the fact that the Foods and Drugs inspector is temporarily off duty. I earnestly urge the gas industry not to fall a victim to it. Their business is not the supply of gaseous volume, but of gaseous *energy*, light, heat, or power potential; and they cannot with impunity substitute "furnace gases" for hydrocarbon vapours, even in the national interest. Those who make straight coal gas will find they can obtain a substantial yield of naphthas without destroying the luminosity of the flat-flames, if they will but make *straight* gas. As regards those who practice more complete washing, it is up to them to replace to a large extent what they extract, by petroleum hydrocarbons through the medium of their water-gas plants. I shall probably be told that the sliding-scale automatically rectifies any infraction of the above principles, but a kettle cannot be boiled nor a joint cooked with the same volume of 500 B.Th.U. gas as of 550 B.Th.U., and this fact is one which no sliding-scale can alter. Still less can it make a non-luminous flat-flame light giving.

It was seriously suggested to me the other day that if the flat-flame users got no light at all, they would be driven to the adoption of mantles. There is, of course, another possibility, and until such times as Parliament may require the suppliers of electrical energy to reduce their voltage by one-half and their consumers to use their present lamps, I would suggest that gas undertakings be very careful not to be led away from the paths of duty and of safety by the "Will o' the Wisp" of *un*-carburetted hydrogen.

CHARLES CARPENTER.

709, *Old Kent Road, July* 1, 1916.

Municipal Consulting Engineers.

SIR,—Permit me to dissociate myself from the plea that municipal engineers should be debarred from undertaking private work. [See "JOURNAL," June 27, p. 680.] I have always advocated that their experience especially qualifies them, in some cases, for such duty.

Surely local authorities requiring evidence can often best be served by those whose duties bring them directly in touch with the subjects under consideration. That local authorities frequently decline to allow their servants to give the benefit of their advice, or in some instances only under debasing conditions, is a poor, mean-spirited policy.

Municipal officers can best be kept qualified, and up-to-date, by being given a free hand, subject to non-interference with their own duties. There have been cases where considerable benefit has accrued to a municipal undertaking by the results derived by the engineer from another undertaking. Many eminent engineers are to be found in municipal undertakings whose services would be of particular value; but, by reason of prohibition, second, third, and fourth rate men have necessarily had to be engaged. After 31 years' experience in municipal work, I can testify from actual knowledge as to the great value of evidence supplied by engineers in the employment of local authorities. In this matter, as in many another, a broad-minded basis requires to be taken—the local and parochial must be obliterated in the larger interests.

On the other hand, it is a fact that extensions of plant might often be more thoroughly and equitably negotiated by the employment of a consulting engineer who would be free from all local interests and local interference to the advantage of local firms. The cry to retain work in "our own town" would cease to exist, or would be replaced by one to retain it in our own country, which would be much more patriotic and businesslike.

EDWARD A. HARMAN.

15, *New Street, Huddersfield, June* 28, 1916.

Burner Cleaning and Mantle Maintenance.

SIR,—In my paper on "Maintenance of Gas Apparatus," read before the Manchester Institution on Feb. 27 last year, I called attention to the trouble from burners being out of order—mainly arising from the fact that, unless the work of cleaning and adjusting was undertaken by the gas department, it was generally left to the maids in a house [see paragraph 4], who, being untrained, could not be expected to know all about a gas-burner.

I little thought when I penned those lines that the work of remedying this state of affairs would be so soon undertaken. I have before

me the "City of Birmingham Gas Department Magazine" for April, 1916, which contains an article and illustrations on "Training School Children in Burner Cleaning and Mantle Maintenance" at Shenley Field Cottage Homes. Most of these children go into domestic service, and will be pioneers in the use of gas, and missionaries to be encouraged by the gas-works.

Birmingham and Mr. Barrett are to be congratulated on this new move, which I trust will be largely followed throughout the country by all gas undertakings where the opportunity occurs.

H. KENDRICK, Engineer and Manager.

Stretford Gas-Works, June 26, 1916.

Daylight Saving Bill.

SIR,—Referring to the recent correspondence on the above, the enclosed diagram may be of interest to your readers, as showing the effect of the Bill on the gas consumption here. It might be explained that the consumption indicated for each hour represents the average for that particular hour during the first week (May 21 to 27) after the Act came into operation, and for the week ending May 29 in the previous year. There were only sixty street-lamps in use for each of these corresponding weeks, from dusk to 10.30 p.m. It may be mentioned that during the year 2000 new cookers were installed.

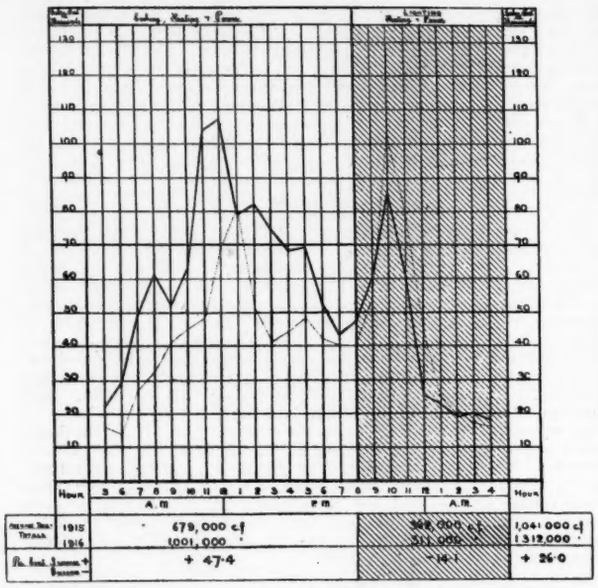


Diagram showing the Average Hourly Deliveries of Gas during the Week ending May 27, 1916, compared with those for the Corresponding Week in 1915.

Notes: Greenwich Mean Time is shown throughout.
The shaded part indicates dark hours.
1915 shown thus ----------
1916 ,, ,,

The comparisons show that, over the dark hours, the average consumption for 1916 decreased from 368,000 to 311,000 cubic feet per day, or 14·1 per cent., and for the daylight hours it increased from 679,000 to 1,001,000 cubic feet, or 47·4 per cent. Also that over the twenty-four hours the total consumption showed an increase from 1,041,000 to 1,312,000 cubic feet, or 26 per cent.

These results show that the Act has achieved its purpose so far as the saving in gas for lighting is concerned. On the other hand, the greatly increased consumption occurring at the meal hours clearly indicates that the consumers are taking advantage of the opportunity afforded them by a liberal policy in the supply of appliances, to use gas for cooking, &c., purposes to a much greater extent than hitherto.

DAVID TERRACE,
Engineer and Manager.

Middlesbrough Corporation Gas-Works, June 30, 1916.

Common Off-Take Pipes for Retort-Settings.

SIR,—I have just received the May 30 issue of the "JOURNAL," and note on p. 446, the middle of the left-hand column, the following:

> "Mr. Carpenter also invented a common take-off main and pipe for a large number of retorts which enabled the construction of retort-benches containing a greater number of retorts than heretofore." [Extract from Mr. West's paper read before the Manchester Institution of Gas Engineers.]

Mr. Carpenter thought he had invented the common off-take pipe; but he has recently learned of his mistake. I have patents in this country and England covering what is known as the Congdon scrubber standpipe system. My English rights are assigned to Messrs. Aldridge and Ranken, No. 39, Victoria Street, Westminster. In this country the Parker-Russell Mining and Manufacturing Company control my patents.

My apparatus has been installed in a number of gas-works in this country—including Philadelphia—and is everywhere successful.

Mr. Carpenter, as Vice-President of the Riter-Conley Company, sued the Atlanta Gaslight Company and me for infringement of his patent covering a common off-take pipe and also on other patents. The case was tried in Atlanta before Judge Newman, of the District Court of the United States for the Northern District of Georgia. The opinion fully sustains every contention we made; and the plaintiff's bill against the Company and me was dismissed.

Enclosed is a copy of the opinion, from which you will note that the Carpenter standpipe patent is declared invalid.

Two English patents long since expired—one by Wates, the other by Hansen—show the common standpipe arrangement. The common standpipe is, therefore, public property. This decision should prove of interest to "JOURNAL" friends.

I am also sending you copy of my brief in answer to the Riter-Conley suit, which no doubt will prove of interest to you. Also enclosed is copy of my patent No. 1,090,813, and a patent to Rowland, No. 211,591. Both these patents show the common off-take pipe.

R. C. CONGDON, Manager.

Atlanta, Georgia, U.S.A., June 16, 1916.

[ENCLOSURE.]

SUMMARY OF THE OPINION REFERRED TO IN THE ABOVE LETTER.

Complainant's patent No. 1,140,113—the "method" patent—restricted and limited as it must be by its history in the patent office, is not infringed by anything done by the defendants, who use a method described in Congdon's patent No. 1,090,813 (known as the "scrubber" patent), using water down the sides of the standpipe, thereby causing proper temperature in the standpipe and preventing accumulation.

As to plaintiff's patent No. 1,122,683—the "valve" or "lateral" patent—the valve used by the defendants is entirely dissimilar to that of the Carpenter and Barnum patent; and consequently there is no infringement.

As to plaintiff's patent No. 1,091,111—the "standpipe" patent—the discharging of a vertical row of retorts into a common standpipe was so well known before this patent was granted, and the discharging of two vertical rows of retorts into a common standpipe being a mere duplication of what was well known and understood in the prior art, the claims of this patent cannot be sustained.

The result is that there must be a decree in favour of the defendants and dismissing the plaintiff's bill.

This 10th day of June, 1916.

Fire-Clay Materials.

SIR,—As the technical chemist to one of the largest fire-brick works in this country, I have read Mr. West's paper with much interest; but I am sorry to note that his Table II. does not fully represent the analysis of a considerable quantity of first-class fire-clay material manufactured in Great Britain.

I have kept a careful record of the composition of a yearly output of thousands of tons of retorts made by our firm, and find the composition to be:

SiO_2 59·14 per cent.; Al_2O_3 35·12; Fe_2O_3 3·17; CaO 0·34; MgO 0·28; TiO_2 1·55; K_2O 0·27; Na_2O 0·13.

Melting point = 3110° Fahr.

The ordinary fire-bricks, blocks, &c., contain up to 37 per cent. Al_2O_3; and large quantities of specially selected fire-clay are made into bricks, &c., which have a composition of:

SiO_2 52·99; Al_2O_3 42·34; Fe_2O_3 2·17; CaO 0·14; MgO 0·13; TiO_2 1·72 $\left\{\begin{matrix}K_2O\\Na_2O\end{matrix}\right.$ = 0.37.

Melting point between Cone 33 and 34 = 3164° Fahr.

The analysis of clays and the manufactured goods from the same are not of any particular interest unless a table of the analysis of the clay can be obtained, showing whether it is a clay of a fairly definite composition or made up of a mixture of different clays, good and bad.

For instance, in Mr. West's Table II., No. 8, the total alkalies are 1·35 per cent., and the oxide of iron 4·63 per cent. A brick or retort with the foregoing figures might be made up with 80 per cent. of a clay containing only 0·42 per cent. of alkalies and 2 per cent. of oxide of iron, and mixed with 20 per cent. of inferior clay containing 5 per cent. of alkalies, and 15 per cent. of oxide of iron.

I have always found bricks low in alumina and high in fluxes to be made from a seam of clay of very uniform composition.

In a letter, one must be brief; but perhaps you will permit me to give a few results of what I might call the analysis of the percentages making up the average composition. The writer some time ago saw two retorts (which may be called A and B) manufactured by different firms, each having a similar composition, porosity, and melting point. The composition of the two retorts was:

	SiO_2.	Al_2O_3.	Fe_2O_3.	CaO.	MgO.	K_2O.	Na_2O.
A.	65·27	29·87	3·74	·34	·29	·22	·27
B.	65·66	29·47	3·45	·33	·47	·39	·23

Being able to obtain a piece of these retorts in the "green" state, I had the samples crushed, sieved, and the various portions calcined for some time at a temperature of 2700° Fahr.

After cooling sample A, 60 per cent. was found to be dark red in colour, 20 per cent. steel grey, 10 per cent. white, and the remaining 10 per cent. had a fused dark brown appearance. An analysis made of each portion showed:

	SiO_2.	Al_2O_3.	Fe_2O_3.	CaO.	MgO.	Alkalies
60 per cent. portion	65·28	29·15	4·26	·42	·31	·58
20 ,, ,,	54·27	43·50	2·23	trace	trace	trace
10 ,, ,,	80·17	17·52	1·54	·27	·17	·32
10 ,, ,,	60·14	30·00	7·61	·62	·42	1·21

If the average composition of sample A is calculated from the above results, it will be found to correspond with the original analysis of the retort A. It so happened that this retort gave very little satisfaction under working conditions, and the reason is obvious.

Sample B was treated to the same process. Every piece after calcination was light brown in colour; and an analysis of various pieces

all agreed with one another, and showed a similar composition as the original retort B—indicating that it was made from a seam of clay (or specially selected clay from the seam) of uniform composition.

Though the mixing of a small percentage of inferior clay with first-quality material can be mixed to make a retort of fair composition and up to specifications carried out in the laboratory, it can be quickly seen how the buyer may be easily misled—causing no end of trouble and amazement that the material did not come up to his expectations. Fire-brick works and other concerns which conduct their business on unscientific principles, are not only keeping back their own progress, but also that of their customers.

Those buyers who talk about price only, forgetting the quality (and the increased works' costs to obtain it), are neither doing credit to themselves nor yet serving to the best advantage the firms whom they represent.

My principal intention, however, was to point out Mr. West's omission in his table of analysis.

With regard to silica bricks, I have recently seen tests carried out on a working scale, made up with a patent binder in place of the usual time bond. The process (which is patented) is using sulphate of lime and silicate of magnesia in place of lime. In their green state, the bricks set like cement, and the melting point and wear and tear under working conditions are much better than the usual silica brick.

June 29, 1916. T. C.

Christiania Gas-Works Administration.—Mr. J. G. Tooms, signing himself Administrating Director and Chief Engineer of the Christiania Gas-Works, writes maintaining the correctness of the statement appearing in the "JOURNAL" for May 2, which Mr. B. K. Schieldrop, in a letter appearing on June 6, maintained was "apt to give an erroneous impression of what had really taken place." It will be recalled that in the issue referred to we congratulated Mr. Tooms "on the confirmation of his appointment as Administrative Director of the Christiania Gas-Works, in succession to the late Mr. O. Pihl."

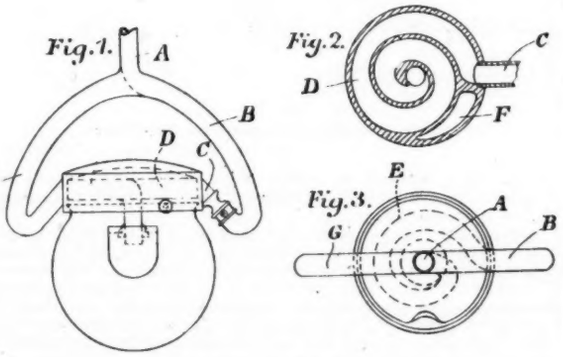
REGISTER OF PATENTS.

Incandescent Gas-Burners.

CAMPBELL, F. W., of Bangor, co. Down.

No. 3633; March 8, 1915.

This invention relates to incandescent burners having a chamber of spiral formation in which the gaseous mixture is heated before reaching the burner nozzle. The gaseous mixture enters the chamber above the burner nozzle and traverses an upwardly inclined spiral passage in it until it reaches the centre, when it flows downwardly to a centrally depending nozzle.



Campbell's Incandescent Gas-Burners.

Figs. 1 and 2 are an elevation and sectional plan of one form of the burner showing the casing with a spiral passage in it. The burner casing is here dome-shaped, and allows the mixture to flow upwardly before discharge. Fig. 3 is a modification in which the mixing tube, after entering the burner casing, is coiled spirally upwards to a centrally situated nozzle.

The centrally suspended burner (figs. 1 and 2) is connected to the overhead gas supply by the central pipe A, and from this pipe a branch B conveys it to the burner casing. This branch pipe is turned upwards at its lower end C, and on the upwardly turned portion are placed the gas and air regulators, the gas being mixed with the air before entering the burner casing. The passage D which leads to the burner nozzle may be as in figs. 1 and 2, or else be formed by a pipe E and be coiled round within the casing as shown by the dotted lines. The casing may be formed with an outlet F, or equivalent outlets may be provided to allow the waste products of combustion to escape.

In addition to the branch pipe B, any number of additional arms G may be provided as supporting or balancing arms, and arranged in such manner as to give uniformity of appearance to the burner as a whole.

The coil pipe E, or the coiled passage D, is more or less upwardly inclined until it reaches the point where it descends to the burner nozzle.

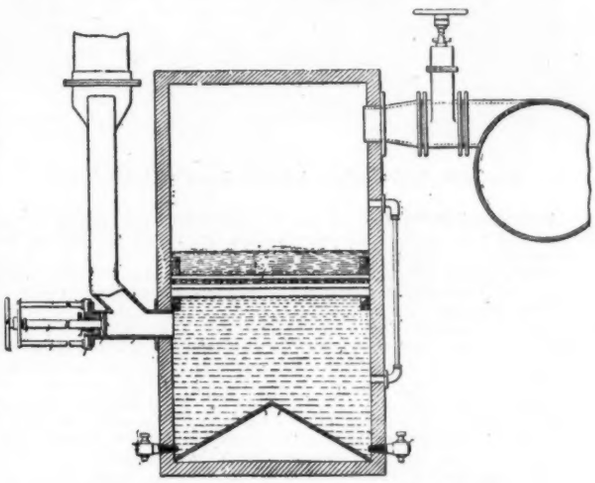
The heating chamber is made so that the globe can be supported from it by screws or otherwise in the usual manner.

Collection of Matter Suspended in Gas.

PEARCE, R. F., of Waterloo, Liverpool.

No. 6199; April 26, 1915.

This invention relates to a modification of the invention described in patent No. 24,509 of 1910, a method of collecting matter suspended in gas, wherein the gas is introduced into a receptacle containing water and a submerged filtering medium; the gas being introduced through the wall of the tank below the level of the water and the filter, and rising up through the water and through the filter—the fume being thereby separated from the gas and remaining in suspension in the water, while the gas issues through an outlet above the water level.



Pearce's Separator of Gases and Suspended Matter.

According to the present invention, the fume to be treated is introduced into the tank below the level of the water and the filter through inlet pipes which do not project into the interior of the tank to any appreciable extent, while the gas outlet opens into a flue in connection with a fan or exhauster, which tends to suck the gas from the container above the water level. The distribution of the gases in the tank is thus effected automatically by the pressure caused by the resistance offered by the filter to the flow of the gases. Further, the inlet pipes are furnished with means by which they can be freed from deposited fume. For this purpose, each inlet pipe (at the point of entry into the tank) is made straight and is furnished with an extension having a plunger or piston designed to be reciprocated in the pipe so as to discharge any accumulation of condensed fume into the tank.

The plunger is provided with a tubular rod having an internal screw-thread and passing through a stuffing-box and engaging a screwed rod mounted in a bearing and furnished with a hand-wheel by which it can be turned, so as to advance or retard the plunger.

Meter for Liquids under Pressure.

RESTUCCI, G., and MUSSO, V., of Naples.

No. 8435; June 7, 1915.

Meters for liquids under pressure as now used—such as water-meters for domestic and public use—owing to their working with clockwork, are (the patentees contend) rather complicated and therefore "easily put out of order, either by being tampered with, or by reason of breakage, bending, or jarring of some of the delicate parts of the mechanism—this resulting in false indications of the water consumed by users, to the evident damage and annoyance of the company or customers, or both."

In the meter the subject-matter of the present invention, "the gearing is reduced to the most simple form, and which cannot be tampered with by outsiders with a view of falsifying the indications of liquid consumed." It is a combination of a horizontal turbine located in a turbine chamber around which the liquid flows (the chamber having an inner circular partition provided with inclined orifices through which liquid impinges upon the turbine blades), with a spring-controlled series of gear wheels of which the unit-wheel has on its dial end a pointer recording, by its rotation in front of a dial, the units of liquid passing through the turbine, while four gear wheels, arranged in series, each receives an impulse causing them to turn one-tenth of a revolution on the complete revolution of the wheel of lower denomination engaging with them—each of the gear wheels having a consecutively numbered disc on its shaft, the respective number of which is visible through an aperture in the dial.

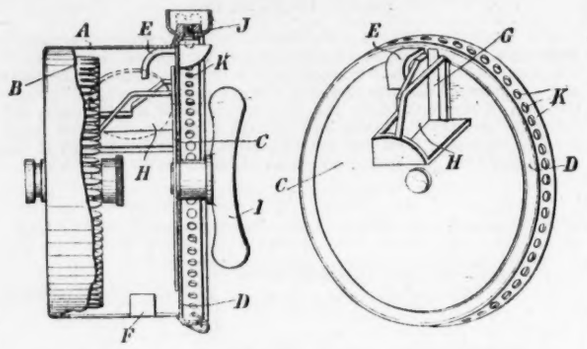
Coin-Freed Gas-Meters.

MACE, B. E., and A. G. SUTHERLAND, LIMITED, of Birmingham.

No. 18,128; Dec. 29, 1915.

This invention is particularly applicable to the type of coin-freed mechanism of gas-meters in which one rotary member is adapted to be clutched to another rotary member by a coin. It relates particularly to the carrier mechanism in which the coin is "accommodated" when connecting the respective rotary members—involving (as it does) a

driving plate or member adapted to engage with a part only of the coin, in combination with a skeleton support occurring on the side of the coin opposite to that on which the driving plate occurs.



Mace's (A. G. Sutherland, Limited) Coin-Freed Gas-Meter.

A sectional elevation is given of one embodiment of the invention, and a perspective rear view of the first rotary member of the mechanism.

A is a cylindrical casing in which the second rotary member B is adapted to rotate in one direction only by some form of one-way clutch, so as to regulate the gas supply in any approved manner. C is the first rotary member of the mechanism; which is rotatably mounted in the cover plate D of the casing. E is a stop (on the cover) which limits the rotation of C in one direction; and F is a stop limiting the rotation in the other direction. In the vicinity of E the member D is furnished with a coin slot. The member C has a corresponding coin slot G adapted to come opposite to the coin slot in D, and C has at its rear face a coin-carrier H. When a penny is inserted through the slot in D and in the rotary member C into the coin-carrier it engages between the teeth of the second rotary member B, which is thereby clutched to the first rotary member C. After the coin has been inserted the parts can be rotated by the handle I. The rotation is limited by the stop F, on one side of which is a slot through which the coin falls from the now inverted coin-carrier into the coin-box. The member D, collectively with the stop E, is rotatably adjustable in relation to the casing—being fixed in any position of adjustmeut by (say) the screw J engaging within any one of the holes K. Thus the degree of rotary movement may be varied according to the quantity of gas it is desired to give for the coin inserted.

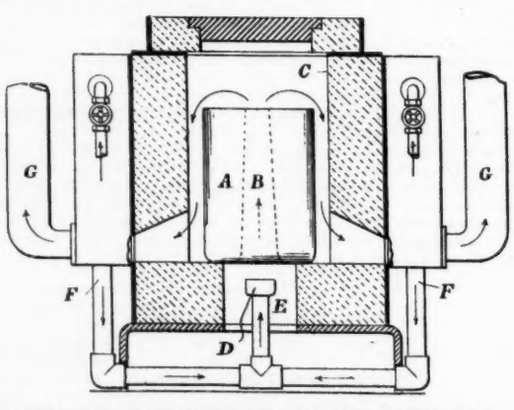
The coin-carrier H comprises a rear driving plate adapted to engage with one side of the coin, and a shaped bar adapted to engage with the other face of the coin. A projection is also provided upon the rear face of C, which also engages with such other face of the coin so that when the latter is inserted, by virtue of the projection and bar, it is retained in position in engagement with the second rotary member B, so that the driving plate upon the first rotary member C can, through the medium of the coin, transmit movement to the second rotary member B. If, however, a smaller coin should be inserted, it is unable to engage with both the projections and the second rotary member B, with the result that, in endeavouring to transmit the rotary movement, the smaller coin is turned backward over the cut-away part of the rear driving plate.

Gas-Heated Crucible Furnaces.—No. 100,499.

SOUTH METROPOLITAN GAS COMPANY and CHANDLER, D., of Old Kent Road, London.

No. 176; Jan. 5, 1916.

To facilitate the melting of substances in annular or vertical flue crucibles by means of gas—such, for instance, as brass, lead, tin, &c.—the inventors arrange the furnace so that the heat from the burner passes up through the vertical passage within the crucible and returns between the outer walls of the crucible and the walls of the furnace, "thus providing for the heating of the crucible in the most efficient manner both within and without."



Chandler's (South Metropolitan Gas Company) Crucible Furnace.

In the sectional elevation, A is the crucible of annular form with a central passage B. C is the furnace, provided with solid walls of refractory material. D is the burner placed within an orifice E in the bottom of the furnace, over which orifice the crucible stands. The burner D is supplied with gas and air by the pipes F, and the flame from the burner passes through the passage B in the direction of the arrows, turns outwards over the top of the crucible, and finds an exit by the flues G after travelling between the outside of the crucible and the walls of the furnace.

Prepayment Gas-Meters.

YATES, H. JAMES, of Birmingham, and THORP, F. & H. T., of Whitefield, near Manchester.

No. 11,181; Aug. 3, 1915.

This invention relates to a prepayment gas-meter adapted for use, more especially, with gas-fires and other gas heating and lighting apparatus.

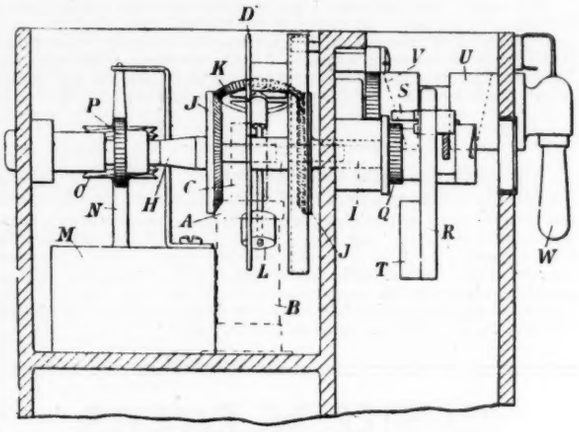


Fig. 1.

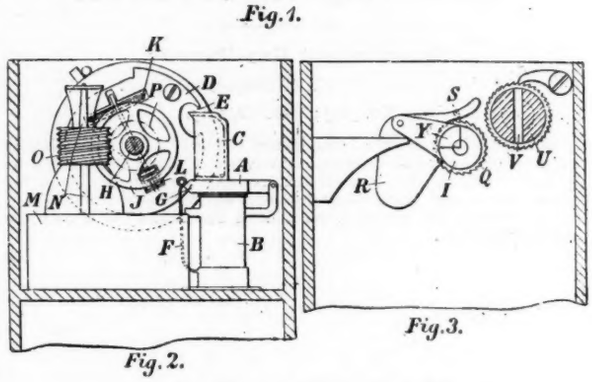


Fig. 3.

Fig. 2.

Yates and Thorp's Prepayment Gas-Meter.

Fig. 1 is a longitudinal section of the meter. Fig. 2 is a cross section showing the valve mechanism, and fig. 3 a cross section showing the coin mechanism.

A flap valve A is hinged on the upper end of the gas outlet pipe B; and adjacent to a hollow extension C on the valve (which extension is closed at its upper end and open at one side) is a disc D having a notch E in its periphery. When the valve is closed the notch lies opposite the upper end of the extension; but on rotating the disc one end of the notch engages the under side of the upper end of the extension and opens the valve. During the further rotation of the disc in the same direction the end of the notch which opened the valve passes out of the extension, and the latter rests against the disc periphery. So long as the valve extension is in contact with the disc periphery the valve remains open. When the notch is brought back to the original position, the valve is prevented from closing under its own weight by a spring blade F, which abuts against a bevelled projection G on the valve. To close the valve, the other end of the notch in the disc bears against the outer side of the upper end of the valve extension and pushes the projection past the spring. When a certain position is reached, the spring, acting on the bevelled end, moves the valve suddenly (independently of the disc); the length of the notch being such as to permit this action.

The disc D is mounted on a spindle freely carried on two co-axially mounted spindles, one of which H can be actuated by the measuring mechanism and the other I by the coin mechanism. On each spindle is mounted a crown pinion J, which engages a planet pinion K carried by the disc; the axis of this planet pinion being at right angles to the valve spindle. The pinion K may be counterbalanced by an adjustable weight L.

The measuring mechanism employed is preferably of the anemometer type (contained in the case M), and is connected through a spindle N and worm O to a wheel P on the spindle H. The measuring mechanism rotates the disc in the direction for closing the valve, and the coin-actuated portion of the spindle operates the disc for opening the valve. In each operation one of the wheels J remains stationary, or there is relative movement between the wheels; sufficient friction being arranged for in the spindle I to ensure this. The other spindle H is held by the worm-gearing. On any convenient part of the spindle I is secured a ratchet wheel Q, adjacent to which is freely

mounted a spring-controlled or counterweighted lever R, which carries a pawl S adapted to impart motion in one direction to the spindle through the ratchet-wheel. Normally the pawl is held clear of the ratchet by the weight (or spring) T provided on the lever. Parallel to the spindle is another spindle U, which is slotted diametrically at V to serve as a coin-carrier and is provided externally with a handle W by which it can be rotated.

When a coin is inserted in the coin-carrier and the latter is rotated, the coin is brought into contact with one end of the pawl lever R. The first action of the coin is to move the pawl into engagement with the ratchet; and the continued action of the coin during its rotation in the carrier is to impart an angular movement to the valve operating spindle through the lever and the ratchet and pawl. Any number of coins may be inserted in immediate succession within the limits provided for by the diameter of the valve-actuating disc.

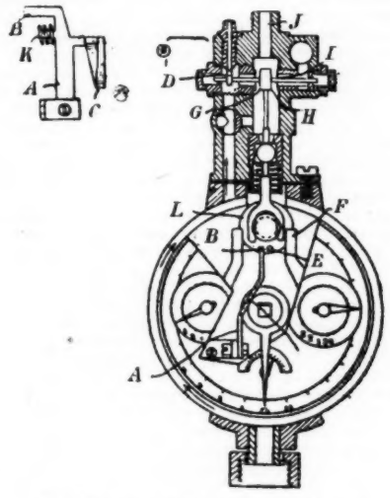
To enable the valve to be closed and the mechanism reset without waiting for the disc to be returned by the action of the measuring mechanism, one end of the spindle I is adapted to be engaged by a key which can be inserted through a rotatable slot in the meter case. Any convenient provision is made for rotating the spindle by the key in one direction only, so that the valve cannot be opened by means of the key. One convenient provision consists in a radially disposed cam-like notch in the end of the spindle with which the flat end of a key can engage. Rotation of the key in the proper direction engages it with the shoulder of the notch and enables the spindle to be actuated; but rotation of the key in the opposite direction simply results in an inoperative movement of the key relatively to the spindle.

Lighting and Extinguishing Gas.—No. 100,307.

FARGE, F. C., of Nice, France.

No. 4828; April 1, 1916.

In this "patent of addition" to No. 24,223, of 1912, a clockwork apparatus for lighting and extinguishing gas-burner jets, as described in the parent specification, is provided with additional mechanism for extinguishing a certain number of the jets at an intermediate time.



Farge's Gas Lighter and Extinguisher.

The mechanism comprises a two-armed lever A B, operating in conjunction with a face-cam C, having a gradual rise and a drop. An additional valve D, controlling the pilot-light supply, is also mounted on the valve-spindle.

In lighting-up, after the stop-pin E on the eccentric has been released by the lighting lever F, it is arrested by the arm B of the special lever A (as shown); the valve G H being central and supplying gas through passages I J to all the jets. The pilot valve D is closed.

At the intermediate extinction time, the drop in the face-cam allows the lever A to be pushed back by the spring K to release the pin E, which then moves over to the extinguishing-lever L. The valve face H then cuts off gas from the jets supplied by the passage I.

For the complete extinction, when the lever L releases the pin E the valve G H is moved over to the extreme left-hand, thereby completely cutting off the gas supply and opening the pilot valve D. The face-cam is adjustably mounted on its shaft by means of internal teeth.

Biddulph Gas-Works Loss.—Speaking at a meeting of the Biddulph Urban District Council, Mr. Casstles said there was a deficit of £853 on the gas-works, which accounted for an 8d. rate. He did not think the general public ever really reckoned up what the undertaking would cost. They had to pay £800 this year, £200 last year, and there was £600 working capital taken out of the loan account, which had already been spent; so that it had cost the rates £1600 since they took over the gas-works. Yet they were told at the time that the works would never come on the rates. They heard recently that the gas-works were going to grow "like a grain of mustard seed;" but if they were going to grow in the same direction as last year, it was going to be very bad for Biddulph. He was not blaming the Gas Manager; and he would not blame the Chairman of the Gas Committee. If the people at the public meeting had been told that the concern would be a loss of £1600 in two years, they would have vetoed the whole business of acquiring the works.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:

Bill read a second time and committed: Local Government (Ireland) Provisional Order [Gas].

Bills read the third time, with amendments, passed, and returned to the Commons: Folkestone Gas [further amendments made], Plymouth and Stonehouse Gas [a further amendment made], Uxbridge Gas.

The Standing Orders Committee reported that the Standing Orders not complied with in respect of the petition for a Bill by the Conway and Colwyn Bay Water Supply Board ought to be dispensed with, and leave given to introduce the Bill. It was subsequently presented and read the first time.

HOUSE OF COMMONS.

Bills read a second time and committed:

Colchester Gas [Lords], Ferndale Gas [Lords], Hornsey Gas [Lords].

Bill reported, without amendment: Local Government Provisional Orders (No. 7).

The Beighton and District Gas Bill has been withdrawn.

The Gateshead Corporation have deposited a petition against the Newcastle-upon-Tyne and Gateshead Gas Bill [Lords].

On Thursday, the Hornsey Gas Bill [Lords] is to come before an Unopposed Bills Committee, consisting of the Chairman of Ways and Means, the Deputy-Chairman, Sir Francis Layland-Barratt, Sir Frederick Cawley, and Mr. Moon.

Standard of Calorific Power Bill.

Day by day last week this Bill was down for second reading; but on Thursday the Prime Minister announced that it would be read a second time to-day.

Coal for Controlled Establishments.

On Wednesday, Mr. CURRIE asked the Chancellor of the Exchequer whether any assurances had been given to either controlled or uncontrolled establishments that unlimited supplies of coal would be obtainable; and whether, in the event of a shortage or of an enhancement of price, uncontrolled firms may rely on the same treatment as others?

Mr. HARCOURT (replying for Mr. M'Kenna) said he did not know of any such assurance. In the event of a shortage of coal, an endeavour would naturally be made to supply firms in the order of their national importance.

Price of Coal (Limitation) Act, 1915.

Mr. M'CALLUM SCOTT asked the President of the Board of Trade whether he had examined the complaints made by the chief city corporations and other gas-producing companies as to the failure of the Price of Coal (Limitation) Act, 1915, to achieve the results it was intended to achieve; whether he had satisfied himself that the Act was not being evaded in practice and that its machinery was adequate to achieve its object; and whether, if the Act had failed to achieve its object, he proposed to take any other steps?

Mr. HARCOURT replied that complaints had been made from time to time by municipal and other gas undertakings with regard to the price of coal. Where sufficient particulars had been furnished, the Board had taken the matter up with those concerned. No doubt the Act was not always effective; but it could hardly be said that it had failed to achieve its object.

Coal Prices.

On Thursday Mr. HOGGE asked the President of the Board of Trade whether he had in contemplation any limitation of all coal prices exported from the United Kingdom, and an increase in the price for inland consumption by the relaxation of the statutory limitation?

Mr. PRETYMAN stated that proposals relating to the price of export coal were under consideration. The Price of Coal (Limitation) Act provides for increases of the standard amount under that Act by Board of Trade Order, if the Board are satisfied that a case for an increase has been made out.

Mr. HOGGE: Will you answer the part of my question with regard to inland consumption, and say whether an increased price will be charged to the consumers in this country?

Mr. PRETYMAN: In that matter the Board of Trade are judicial, and no decision can be given until the application is made and duly considered.

War Bonus at Lancaster.—It was stated at a meeting of the Lancaster Town Council last Wednesday that a war bonus of 3s. per week had been granted to all men on the wages-sheet. There was a war bonus of 2s. previously, to all men earning under 25s. per week; and the new bonus will take its place for all men over 21 who work a full week, except with absence by leave, while those under 21 will receive a bonus of 1s. 6d.

Irvine and District Water Board.—New rapid gravity filtration plant erected for the Irvine District Water Board at the Greenhead filtering-station by the Paterson Engineering Company, to meet the growing needs of the towns of Irvine, Kilwinning, Stevenston, and Saltcoats, as well as Messrs. Nobel's works at Ardeer, was inaugurated last Wednesday in the presence of a representative gathering from the various towns, including the members of the Board. The ceremony of declaring the new filtering station open was performed by Provost Borland (the Chairman of the Board); and he, along with ex-Provost James Miller (Ex-Convener of the Works Committee), and Bailie John Armour (the present Convener), were the recipients of mementos of the occasion. The works recently constructed have altogether cost £60,000, bringing the total expenditure to date to £275,000.

LEGAL INTELLIGENCE.

RETORT-HOUSE AND AN EMBANKMENT FIRE.

A Peculiar Case at Blyth.

At the Newcastle Assizes last Friday, Mr. Justice Shearman, without a Jury, was occupied during the whole of the day in trying an action brought by the North Eastern Railway Company against the Blyth Gas Company for negligence and trespass; the circumstances of the case being of a somewhat remarkable character. There was a fire in a railway embankment; and this embankment was discovered, after the fire started, to be very largely composed of small coal. The fire, it was claimed, was due to heat from a retort-setting below the gas-works ground level, through the substrata, firing the coal in the embankment on the other side of a stone wall. The retort-setting has the producer below ground level, with a subway. It does not, however, touch the wall referred to.

Mr. E. SHORTT, K.C., M.P., and Mr. SIMEY were for the plaintiffs; and Mr. MITCHELL INNES, K.C., and Mr. SCHOLEFIELD, for the defendants.

Mr. SHORTT explained that the plaintiffs claimed damages in respect of injuries to an embankment and a bridge, caused by a fire, the allegation being that the fire originated in, and was caused by, the retort-setting furnace belonging to the defendants. The claim included a declaration that defendants were liable to pay for some of the damage which had not yet been put right. The plaintiffs' railway ran upon an embankment which was built in the forties. It was originally known as the Blyth and Tyne Company, but was taken over by the plaintiffs under the Transfer Act of 1874. The embankment was still as constructed in the forties. The land was originally leased from Lord Ridley; but in 1897 or 1898 the freehold was purchased. No doubt his Lordship would be surprised, as he himself had been, to find that the lowest stratum of the embankment was small coal, then sandy loam, then coal mixed with sand, and then ballast. In May, 1914, the defendants extended their retort-settings; and, in order to do this, they had to excavate ground running up to the retaining wall of the embankment. In March, 1915, the plaintiffs' servants noticed steam coming from the wall, which appeared to be what they called "sweating," and on March 23 they noticed it had become worse. The embankment eventually got alight, and the coal was burnt out; and then the embankment subsided. No doubt, it was a curious way to build a railway embankment; but it had done its work for sixty years.

His LORDSHIP: I am not an engineer, but it seems unusual. I suppose in the neighbourhood coal was very cheap.

Mr. SHORTT said he understood that in this district there was a good deal of embankment built in the same way. The coal was set on fire by the heat coming from the furnace in the retort-setting. There was no question as to the amount of damages.

Mr. *David Hill*, Assistant Engineer to the Railway Company, said he was informed in 1914 that the defendants had been underpinning the retaining wall, and went to see it. He thought the underpinning was insufficient, and told the defendants' representative so. In 1915, he heard that a fire had broken out in the wall; and he again visited the scene. Later the fire extended; and when he examined the place he found smoke coming from the abutment of a bridge, the stones of which were too hot to allow anyone's hand to rest against it. In December last, he put his hand against the outside wall (made of brick) of the retort-setting; but it was so hot he had to take it away immediately. In his opinion, the fire was due to the proximity of the retort-setting to the plaintiffs' boundary wall. He could see no other cause. There was never anything wrong with the wall before.

Cross-examined, he denied that before the underpinning the wall was ruinous, dilapidated, and hanging over. He did not agree that throughout the whole length of the underpinning the foundations of the wall had been entirely defective.

Mr. MITCHELL INNES: The fire would never have occurred, assuming that heat escaped into the embankment, but for the presence of the coal?

Witness: I do not think there is any doubt about that.

Mr. *F. C. Busscarlet*, Engineer to the Railway Company, said the embankment to-day was, as far as he knew, in the same condition as when originally built. The plaintiffs put the fire out. They really surrounded it. They removed the coal, and filled it in with sand except in the centre, where they let it burn out. He expressed the opinion that the fire started beside the retort-setting, and worked its way along to the bridge, and that it was due to heat from the extension of the retort-house.

His LORDSHIP: This case may be summarized by saying a fire broke out, and suspicion fell on the retort-setting. It is your duty to bring it home to the retort-setting.

Witness, cross-examined, said traffic would no doubt have increased over this particular line. It was not a passenger line. He thought it very unlikely that in this case increased pressure would expose inflammable material such as coal to combustion.

Professor *Henry Armstrong* said he was acquainted with a great many embankments constructed as the one in the present case; and he had never heard of an instance of spontaneous combustion. The coal became "dead," and he could not conceive of any coal which had lain so long taking fire. In his experience of forty years, he had never known such a fire in a similar embankment. When he said that the coal became "dead," he did not mean that the pyrites had vanished.

Mr. MITCHELL INNES, for the defence, said his submission was that the Gas Company did not cause the fire; and, assuming they did cause it, there was no evidence whatever of negligence. Two elements were necessary to fix the liability upon the defendants—first, that the retort-house was too close to the embankment; and, secondly, knowledge that the embankment was largely composed of coal.

Mr. *A. Clement Hovey*, Consulting Engineer to the plaintiff Company, said the retorts were erected from his plans and under his supervision. In his experience of twenty years he had never seen any retort-setting stand so well. With regard to the plaintiffs' retaining wall, it was standing where the underpinning had been done; but a little further along, it had fallen away. He thought the fire was most likely to have originated from spontaneous combustion.

Mr. *James Eadington*, Manager of the Gas Company, said that when they levelled the site for the new retorts the plaintiffs' wall was in a very poor state. The wall rested on small coal and "duff." It was necessary to underpin the wall; and for a length of about 15 feet it was underpinned with bricks and cement. When the representatives of the Railway Company saw witness, they expressed satisfaction with what had been done; but they objected to the trespass, and told him not to do it again.

Mr. *A. C. Fawcett*, Secretary of the Gas Company, said he was present at the interview with the railway representatives, and Mr. Hill expressed himself satisfied with the underpinning; but he told them not to do any more without consulting the Railway Company.

Mr. *W. Doig Gibb*, formerly Chief Engineer to the Newcastle and Gateshead Gas Company, said he thought the cause of the fire had undoubtedly been spontaneous combustion.

His LORDSHIP said he had come to a clear opinion. He was quite satisfied so much heat was generated in the retort-house that it was impossible to prevent a great deal of it escaping. It was possible the fire was due to spontaneous combustion, but he had come to the conclusion that the heat from the retort-setting set fire to the coal. He did not say the defendants had been guilty of negligence; there was no negligence in the construction of the setting. But he found they had caused a nuisance. His judgment was for the plaintiff Company, for such an amount as might be agreed upon, together with costs.

Stay of execution was granted on the understanding that any appeal would be lodged within twenty-one days.

Breach of a Sulphate of Ammonia Contract.

In the Court of Appeal last week, Lords Justices Swinfen Eady, Phillimore, and Bankes had before them the case of *Mitsui and Co. v. Watts, Watts, and Co.*, in the form of an appeal by the defendants from a decision of Mr. Justice Bailhache, which was recorded in the "JOURNAL" for Feb. 8 last [p. 315]. The action was to recover damages for breach of a charter party of June 5, 1914, in regard to the carriage by steamer to Japan of a cargo of 3500 tons of sulphate of ammonia. The plaintiffs contracted with the defendants for them to send a steamer to Mariopol, in the Sea of Azov, in September, 1914, and there load the cargo and take it to Japan. Defendants failed to send the steamer, pleading the war as justification. Plaintiffs bought the sulphate from the Evence Coppée Company; and the latter's claim for damage for non-acceptance by plaintiffs was settled for £4500. Mr. Justice Bailhache did not think the defendants could plead the closing of the Dardanelles as an excuse for their breach of contract. The plaintiffs were entitled to recover as damages against the defendants the sum of £3800 profit that they would have made if the goods had been carried to their destination; but the £4500 that they had paid to their sellers as compensation was too remote as damages against the defendants. Judgment was entered for the plaintiffs for £3800 and costs. In delivering judgment, Lord Justice Swinfen Eady said that, having regard to the terms of the charter party, the defendants were liable for substantial damages, the amount of which would be ascertained by an Official Referee, unless the parties agreed that there should be a special reference. In his opinion, Mr. Justice Bailhache had not arrived at his figure on a proper basis, which should have been the difference between the price that would have been realized by the sale of the goods in Japan, on the probable date of the arrival of the steamer, and the cost of the cargo at the port of loading at the date when it should have been shipped, together with freight and insurance. This had not been ascertained, and must be the subject of an inquiry. The claim of the plaintiffs to recover from the defendants the £4500 which they had paid the vendors of the cargo for their breach of contract could not be taken into account in the estimation of the damages. The costs of the appeal would be reserved. The other Lords Justices delivered judgment to the same effect.

Lyttelton (N.Z.) Gas Supply.

Reporting on the operations of the Lyttelton (N.Z.) Gas-Works for the twelve months ended March 31, Mr. W. M'Auliffe (the Engineer and Manager) remarks that the undertaking has fallen into line with the majority of other works similarly situated, all of which are feeling the effect of the disarrangement of trade caused by the phenomenal prices of all material—particularly meters and pipes. Several short lengths of mains have been laid, and 25 new services connected during the year; but, notwithstanding these additions, the make of gas, by the station meter, is a fraction less than in the previous year. On the other hand, there is a slight increase in the make of gas per ton of coal, and an increase on the sale of residuals, which more than make up the decrease on the total make of gas; so that the profit for the year has been maintained. It is some thirteen years ago that the Council took over the gas-works at a big price. Since then the whole of the old plant had been scrapped, and the works reconstructed with new and up-to-date plant. During the same time, the price of coal has increased 15 per cent., and the price of gas for lighting has been reduced over 40 per cent. The price now charged for gas will bear comparison with any other works of similar size in Australia or New Zealand. The quantity of gas made in the twelve months was 16,943,000 cubic feet, or 12,681 cubic feet per ton of coal carbonized. The proportion unaccounted-for was 4·6 per cent.

Loss on the Goole Gas-Works.—It is reported that the accounts of the Goole Urban District Council gas undertaking for the year ended March 31 last show a loss of £2742, equal to a rate of 10d. in the pound. The deficit is chiefly accounted for by the lighting restrictions, the increased cost of coal, the rise in wages, and war bonuses to workmen.

MISCELLANEOUS NEWS.

PLYMOUTH GAS COMPANY.

High Freights and Coal Supply.—Co-Partners and Trade Unions.

The Annual Meeting of the Plymouth and Stonehouse Gaslight and Coke Company was held last Thursday—Sir JOSEPH BELLAMY (the Chairman) presiding.

The CHAIRMAN, in moving the adoption of the report (a summary of which was given in the "JOURNAL" last week, p. 706), said that the figures were on the whole satisfactory, though the difficulties encountered during the past year had been enormous. The production of gas per ton of coal had reached 12,946 cubic feet, as against 12.338 cubic feet last year, and a gradual advance from 11,000 cubic feet. The tar-distilling works of the late Mr. Harvey had been acquired, and would form an important part of the Company's business. Now that the works passed into the possession of the Company they intended that the other gas-works in Devon and Cornwall should be fairly treated. They would all know what profit was being made out of the tar, and they would get a fair and legitimate price. At the desire of the Government, they would undertake the production of high explosives as part of the tar-refining business.

COAL SUPPLIES.

The difficulties encountered in regard to the supply of coal last year were unprecedented in the Company's history of 70 years. When war broke out they had a contract with Messrs. William Cory and Sons, of London, for conveying coal by steamer to Plymouth. It was a very good contract for the Company. When a large proportion of their steamers were taken by the Government at the outbreak of war, Messrs. Cory said the contract was at an end. The Directors took a contrary view; though they made one or two small concessions. Messrs. Cory then carried the contract out, as very few shipping firms would have done. As compared with the freights current during the past two years, this meant a saving to the Company of £50,000. Credit was due to the crews of the steamers; and from the captains to the cabin boys everyone had received a nice little gratuity from the Company at the end of each voyage. They did not lose a single cargo, and had been kept going, though the delays had caused anxiety. At one time, the quantity of coal in store dropped to a few days' supply; and they had to get a supply from Yorkshire to guard against the risk of stoppage. The contract with Messrs. Cory came to an end with the month of June. He was elected a member of the Committee of representatives of gas and electricity undertakings which was appointed last year to consider the question of coal supplies. The result of the action they took was that the Government fixed a limit of 4s. per ton on the price of coal as compared with contract rates before the war. Under this arrangement the Company had to go to Durham for coal as they had been accustomed to do, and they made a contract which represented a saving to the Company of £10,000, or 3s. per ton.

INCREASE IN THE PRICE OF GAS.

They had had to advance the price of gas to ordinary consumers from 2s. to 2s. 8d. per 1000 cubic feet. Slot consumers would continue to receive the same number of feet for a penny, but the discount which had been allowed would be suspended. Gas for power purposes would be supplied at 2s. 3d. What was the cause of the increase? The war and the Germans, the scarcity of steamers, and the abnormal freights. Messrs. Cory refused to enter into a new contract with the Company, but offered to supply steamers at London freights, *plus* an addition for the extra distance to Plymouth. This meant an increase over the contract rates of £85,000 for the carriage of coal. Railway transit was the only alternative. All the railway companies said they had no waggons; but one private owner offered a rate which was prohibitive. Finally they made an arrangement with Messrs. Cory for the supply of 250 15-ton waggons, which were now on their way to Newcastle. How the arrangement would work they did not know. It was estimated that it would take three weeks for the journey to Plymouth and back to Durham, and the supply would scarcely keep them going; but they could not go to nearer collieries without paying the market price of 37s. for coal, instead of 16s. per ton, which was the contract price. However, the gain by railway carriage as compared with steamers worked out at £34,700. With regard to oil, the price had gone up from 2 5/16d. per gallon, which they were paying before the war, to 9⅜d.; and the increased cost was £21,696. Taking everything into calculation—coal, carriage, oil, and wages—they had about £76,000 increased expenditure to reckon upon as compared with last year. Assuming nothing occurred to improve matters, this meant that the price of gas would have to be advanced to over 3s. per 1000 cubic feet. They prepared estimates with the possibility of a deficit; but they were making arrangements for only three months at a time, hoping that the situation would improve. It was suggested that the increase in the price was due to the Daylight Saving Act; but a comparison of the output of gas for the five weeks ending June 23, after the Act came into operation, showed an increase of 2,000,000 cubic feet in the sale. Military restrictions had affected gas undertakings to some extent; but, notwithstanding this, they were still increasing their sales. They might be hurt by the competition of electricity. It was an axiom in trade that the bigger the output the cheaper the cost; and as electricity was mainly a luxury of the well-to-do, the effect of the competition was to increase the price of gas to the middle and working classes. They had the immense number of 19,500 slot meter consumers who were interested in this question. The position of the Company was absolutely sound. He had an ideal once of Plymouth gas at 1s. 6d. per 1000 cubic feet. They did get down to 1s. 7d.; and when normal conditions were again reached he still hoped, with the aid of science and technical knowledge, and a little support which they hoped to receive from the tar-distilling undertaking, that they might see gas at 1s. 6d.

The report was adopted, and dividends were declared of 5¾ per cent. on the ordinary stock, 9s. per share on the "additional" shares, and 8s. 6d. per share on the "new" shares.

CO-PARTNERSHIP V. TRADES UNIONS.

The CHAIRMAN moved that, under the co-partnership scheme, 3 per cent. be paid to the employees on the wages earned. He explained that this was beyond the provisions of the scheme; but the employees had been of considerable help, and the Directors thought they should have some share of the gross profits. Circumstances had arisen which, however, demanded consideration. Recently the Dockers' Union had been very active, and they had been informed that some of their men were joining the Union. He was satisfied that the majority of the men were loyal to the Company; and he did not want the co-partnership scheme to come to an end. They had increased wages three times, and had helped all their men who had gone to the front. The men would be asked to sign a document showing whether they wished the co-partnership scheme to continue or whether they preferred to join the Union. They could not have both. The Directors were quite friendly with the men, and hoped to remain so; but they must take the risk of coming to an understanding with them.

The resolution was adopted.

The thanks of the meeting having been passed to the Board,

The CHAIRMAN, in replying, spoke of the valuable help of the staff, particularly of the Secretary (Mr. H. B. Heath), the Engineer (Mr. P. S. Hoyte), and the Assistant-Secretary (Mr. Bolton).

MANCHESTER CORPORATION GAS UNDERTAKING.

Report and Accounts.—Gas Profits and the Rates.

From the Superintendent of the City of Manchester Gas Department (Mr. F. A. Price), we have received a copy of the report and accounts of the Gas Committee for the year ended March 31.

Before reproducing the main portions of the report (which is signed by Alderman William Kay, J.P., the Chairman of the Committee), it may be mentioned, in connection therewith, that at a meeting of the Committee last Thursday, it was resolved:

> That the Council be reminded that the arrangement of Jan. 22, 1913, under which the Gas Committee are required to contribute to the City Fund the sum of £50,000 per annum for a period of three years, will expire at the end of the current financial year—*i.e.*, on March 31, 1917—and that, having regard to the totally changed conditions due to the war, and to the consequent financial burdens, including income-tax, the Committee respectfully submit it is imperative that the Council should at once review the whole question of rate-aid by the Committee.

INCOME AND EXPENDITURE.

The income from the sale of gas for the past year was £681,457, and from residuals (including £3871 from recovery of toluol, &c.) £253,640; the figures for the preceding year having been respectively £585,985 and £170,476. Adding sundry receipts, the total income reaches £935,843, as against £757,167. On the other side the expenditure was £752,917, compared with £666,380; the gross profit for the year being £182,926, whereas twelve months ago it was £90,787. Deducting the amount (£41,691) paid for interest on loans, &c., a net profit of £141,235 is arrived at; the corresponding figure twelve months ago having been £51,159. The net profit has been appropriated as follows: Excess appropriation of £34,009 being carried forward to next year's account; deficit from last year's account, £52,708; sinking fund for redemption of loan debt, £63,163; city fund in aid of rates, £50,000; applied in extension of works where borrowing powers are not granted, £9373—total, £175,244.

The quantity of gas sold was 5,700,014,000 cubic feet, a decrease of 3·08 per cent. on the corresponding figures for the previous year; and the average price realized was 2s. 4·47d. per 1000 cubic feet. The cost of coal and oil per ton carbonized was 14s. 9·60d., as against 12s. 6·94d. for the previous year; while the income from residual products rose to 10s. 0·06d. per ton, as compared with 6s. 5·19d. These figures represent a decrease of 1s. 4·21d. per ton in the net cost of raw material, which on the carbonization of 507,012 tons amounts to £34,244.

The amount transferred from revenue to the credit of the renewals account is £67,751, which, together with the interest on the fund, makes a total credit for the year of £72,122. The sum of £72,466 has been expended during the year. The balance to the credit of the account is now £145,360.

On capital account, no loans, apart from those required for replacements, have been raised during the year. By virtue of the powers conferred by the Manchester Corporation Act, 1914, the sum of £27,741 has been loaned from the sinking fund and applied to the replacement of loans on capital account. The expenditure amounts to £39,857. Of this sum, £9372 has been provided out of net profits, and the balance out of loans. The total capital outlay at March 31 last was £3,083,627, the loan debt in respect of which was £973,372. The balance of sinking fund not actually applied to the redemption of debt at the same date was £28,819.

THE EUROPEAN WAR.

At March 31, 637 employees had joined His Majesty's forces. The estimated war service allowances payable under the Council's resolutions, including the Street Lighting Department, will amount to £28,000 per annum.

It is gratifying to record that the officials of the department inaugurated on Aug. 1, 1915, a war benevolent fund of their own, to which voluntary weekly contributions have since been made; and at March 31, 1916, the substantial balance of £369 was in hand. The fund was established to assist the widows and orphans of colleagues who might be killed in action, also those colleagues who might be incapacitated through service with the Colours. Several distressing cases of this character have already been relieved. It is not the intention of the Committee of Management to seek assistance from the Gas Committee in the maintenance of the fund.

In accordance with the resolution of the Committee, gas is still being

supplied to the Belgian Hostels and the Red Cross and Voluntary Military Hospitals at one-half the usual price.

In addition to the war bonus of 4d. per shift to shift workers, and 2s. per week to all other men engaged in the manufacture and distribution of gas, except foremen and tradesmen, a further bonus of 3s. per week, conditional upon good time-keeping, was granted as from Feb. 11, to all men working inside the gas-works, with the exceptions referred to. The total annual cost of the war bonuses, including those of the Public Street Lighting Department, will be about £13,000.

The decreased consumption through public street lamps due to the Restriction of Lighting Orders was 183 million cubic feet; and the estimated decrease in private consumption due to the restricted lighting and earlier closing of shops, &c., was 130 million cubic feet.

Summer Time Act.

The Summer Time Act, which came into operation on May 21, is expected to cause a reduction in the private gas consumption of about 100 million cubic feet to Oct. 1.

Statistical.

The following particulars are furnished as illustrating the growth and working of the department during the year:

—	Year 1915.	Year 1916.
MANUFACTURE—		
Material carbonized—tons	530,042	507,012
Gas made—Thousands cubic feet	6,232,967	6,067,751
,, per ton—cubic feet	11,759	11,968
Illuminating power as tested by "Metropolitan" No. 2 burner—candles	15·87	14·22
Calorific value, B.Th.U. (gross)	567	539
Coke available for sale—cwt. per ton of coal	10·81	11·18
Tar made—gallons per ton of coal	11·90	12·23
Ammoniacal liquor made—10 oz.—gallons per ton of coal	31·50	30·20
DISTRIBUTION—		
Mains—Miles laid	988¼	992¾
Output of gas—Thousands cubic feet	6,237,403	6,067,094
Gas sold ,, ,, ,,	5,881,103	5,700,014
Gas unaccounted for (adjusted) ,, ,,	203,027	194,673
,, ,, ,, per cent. on output	3·25	3·21
Total number of consumers (including automatic)	189,201	190,956
Number of automatic consumers	72,202	74,506
Gas sold to automatic consumers—Thousands cubic feet	965,388	998,880
Gas cookers and fires:—		
Number fixed and owned by Committee—		
Cookers	80,333	86,137
Grillers	36,966	37,661
Fires	17,083	20,511
	134,382	144,309
Gas consumed (estimated)—		
Cookers and grillers—Thousands cubic feet	1,016,500	1,083,500
Fires—Thousands cubic feet	185,000	235,000
Per cent. of consumers having free use of cooker or griller	62	65
Private Lighting—		
High-pressure lamps	359	1,016
Low-pressure lamps	293	1,025
Maintenance—		
Total number of burners	18,985	38,984
Public street lamps—		
Within the city	21,427	21,442
Without the city	1,420	1,421
	22,847	22,863

Public street lighting restrictions: There was a decrease in the quantity of gas supplied for the public lamps of 183,419,000 cubic feet, equal to 3·02 per cent. on the output.

Extension and Renewal of Works.

Some of the main extensions and renewals of works carried out may be indicated;

Gaythorn Station.—At these works a new power-house has been constructed, containing plant for the pumping of gas from the Bradford Road station. The plant is in two sections, each section consisting of a "Rateau" fan, capable of passing 750,000 cubic feet of gas per hour, driven by a "Terry" turbine of 110-H.P. Two Livesey washers, capable of passing 4 million cubic feet of gas per 24 hours, have been constructed.

Bradford Road Station.—The most important work carried out at this station has been the reconstruction of No. 1 retort-house, one section of which is now nearing completion, and will be at work by next winter. When it is completed, this house will contain 26 settings of horizontal through retorts, with ten retorts to a setting, which will be drawn and charged by Fiddes-Aldridge stoking machines. The whole of the machinery will be electrically driven; and a novel arrangement of dealing with the coke has been introduced. The retaining wall in connection with the extension of the sidings has been completed; but the work of clearing the land has had to be suspended for a time, owing to the difficulties of transport arising through the war.

Chemical Works.—At these works, a contract was entered into for the construction of spent oxide burners of the "Wyld" mechanical type, which will shortly be completed, and result in a considerably increased output of sulphuric acid.

High-Pressure Mains.—High-pressure mains continue to be laid throughout the city, for the purpose of street lighting and private consumers. The total length now laid is 12 miles 793 yards, varying in diameter from 2 to 9 inches.

Private Lighting Department.—The Restriction of Lighting Orders have again seriously handicapped the work of the department, particularly in regard to outside shop lighting. Despite this fact, however, there has been a satisfactory increase in the number of high and low pressure lamps fixed under the hire and maintenance system, including a number of high-pressure installations in important factories. The burner maintenance system continues to give every satisfaction to consumers.

Mr. Price's Statistics.

Mr. Price has also once more brought up to date the useful set of statistics compiled by him, which indicate at a glance the position of the undertaking in every respect as compared with the previous twenty years. The excess of assets over liabilities is shown to be £2,262,073. Capital charges amount to 4·48d. per 1000 cubic feet of gas sold, and the net profit to 2·09d. The average price obtained for gas and meter and stove rents during the past year was 2s. 4·47d. per 1000 cubic feet. The production of gas per ton of coal carbonized was 11,968 cubic feet, of a calorific value of 539 B.Th.U. gross. The following is the appropriation of net profits from 1844 (the year in which the works were taken over by the Corporation) to March 31 last.

Paid over to the Improvement Committee for improvement purposes, 1844 to 1887 inclusive	£1,367,641	8	11
Paid over to the Water Committee (one moiety of profits from 1852 to 1861 inclusive)	166,265	4	7
Cost of street lighting from 1879 to 1891 inclusive, borne by the Gas Committee	329,201	13	2
Paid into the City Fund, 1888 to 1916 inclusive	1,404,066	5	7
Total amount applied in lieu, or in aid, of city rates	£3,267,174	12	3
Total cost of land, buildings, and plant, to March 31, 1916	£3,083,627	6	1

BRADFORD CORPORATION GAS DEPARTMENT.

Engineer's Report on the Past Year's Working.

The report of Mr. Charles Wood (the Gas Engineer and Manager), on the working of his department during the year ended March 31 last, was presented to the Bradford Corporation Gas Committee last Friday.

The year, Mr. Wood remarks, has been a difficult one for all gas undertakings. The Committee were fortunate in having good stocks of coal, as well as a considerable quantity bought before the general advance of 5s. per ton came into operation. Most of this coal has now been delivered. Much of the coal supplied during the past winter was of inferior quality; but the department were obliged to take what they could get in order to keep the works going. Many of the best workmen have joined the army; and it has been impossible to replace them with equally competent men, while the cost of everything has gone up. Coke, ammonia, and spent oxide have realized good prices; but the value of tar, owing to the stoppage of the export of pitch and creosote, has fallen nearly 50 per cent. during the year.

Working Figures.

The quantity of gas sold shows a decrease of 11·4 per cent. Of this, 7 per cent. is due to the curtailment of street lighting. Repairs have been restricted to a minimum; and the whole cost of the absolutely necessary new mains and services has been charged to revenue.

A sum of £3133 has been paid in allowances to soldiers' dependants, and £5671 in war bonus. Coke and gas to the value of £984 have been supplied without charge to the Belgian refugees and the Lord Mayor's Relief Committee. The advance of 5d. per 1000 cubic feet in the price of gas since July 1, 1915, has yielded about £14,000; but it probably accounts for some portion of the reduced consumption. The City Treasurer has only allowed £12,750 as the Finance Committee's contribution to the cost of street lighting, instead of the usual £27,500. It is necessary, therefore, to point out that, even when the lamps are not lighted, the Gas Committee incur considerable expense in the maintenance of the manufacturing and distributing plant which is lying idle in consequence. If the Committee were credited with the actual cost to the department, as a gas company would have been, their financial results would have been at least £12,000 better.

The total quantity of gas produced during the year was 2,012,281,000 cubic feet; being a decrease of 224,836,000 cubic feet, or 10·05 per cent., compared with the previous year. The gas sold—including 30,680,000 cubic feet used in public lamps—amounted to 1,808,980,000 cubic feet, or a decrease of 11·48 per cent.

During the year, 182,769 tons of coal and cannel were carbonized; 4·04 per cent. of cannel being used, as against 3·28 per cent. in the previous year. The average cost of the coal and cannel carbonized—including cartage and handling—was 15s. 8·71d. per ton; the figure for the preceding year being 13s. 5·43d. There were 280 lbs. of coal carbonized per ordinary retort charged, or 12 lbs. less than last year. As the vertical retorts at Thornton Road are charged continuously, they are excluded. The average quantity of gas made per ton of coal was 11,009 cubic feet, or 372 cubic feet less than last year.

Financial Results.

Dealing with the actual revenue account for the year, carbonizing wages absorbed £26,912, an increase of £1707. Coal cost £143,708, or £12,643 more. The sum of £32,158 was spent on repairs and maintenance of works, being £1385 less. The repairs to mains and services (including the cost of new services), as well as the cost of some mains that would ordinarily have bean charged to capital, amounted to £7579, a decrease of £1397. Bad debts, which amounted to £605, show a decrease of £134. This is the lowest amount for many years. The department had to pay £16,641 for rates, or £1162 more. The stoves and fittings department cost £10,516; and the revenue was £8118, leaving the net cost at £2398.

The following are the main items of income: £204,848 was received for gas, being an increase of £12,702, due to the advanced price. Meter-rents produced £2507, or £435 less. Coke yielded £48,577, or

£13,002 more. Tar brought in £9688, a decrease of £8321, and ammoniacal liquor produced £19,494, an increase of £4058; while from the sale of spent oxide to the chemical works there was obtained £6084, an increase of £2891. The cost of coal less residuals (excluding the profit on the chemical works) was £65,948, or £3905 worse than last year. Spent oxide, after deducting cost of purification, yielded a profit of £3006. Rents received amounted to £1016, or £2 less. The gross profit on the chemical works—including the profit on the sale of the ammoniacal liquor—was £7923, as against £5347 last year.

The gross or trading profit for the year amounted to £48,570, or £13,188 more than for the previous year. Interest on loans, &c., amounted to £28,163, which is an increase of £1635. Income-tax was £1332 less; while the sinking fund contribution of £20,333 shows an increase of £1213. The net loss is £2826.

During the year the sum of £19,620 has been spent on capital account on the vertical retort installation at the Birkshall works. The total expenditure on capital account to the end of the year was £1,253,856, of which £539,034 has already been repaid, in addition to £5852 remaining to the credit of the sinking fund account.

The department have been credited by the Finance Committee with only £12,750 towards the cost of street lighting, which has cost more than twice this amount. The snm paid to the department for the gas actually used in the lamps works out at 2s. 0·73d. per 1000 cubic feet, while nothing is allowed towards the expenses unavoidably incurred in addition.

The average cost of the gas per 1000 cubic feet in the holders has risen to 13·771d. The average illuminating and calorific power of the gas supplied during the year has been maintained as nearly up to the standard as the requirements of the Ministry of Munitions would permit.

WORKING STATEMENT.

The following are some of the items from the working statement for the past year; the figures for 1915 being given for comparison:

	1915.		1916.
Coal and cannel carbonized, tons	194,846	..	182,769
Cost of coal, per ton	13/5·43	..	15/8·71
Gas made, cubic feet, thousands	2,237,117	..	2,012.281
,, ,, per ton of coal	11,481	..	11,009
Retorts charged (excluding Thornton Road)	1,102,765	..	1,125,613
Gas used by public lamps, thousands	175,898	..	30,680
Gas accounted for, thousands	2,043,661	..	1,808,980
,, ,, ,, per ton of coal	10,488	..	9,897
Gas unaccounted for, per cent. on make	8·65	..	10·10

The analysis of the accounts shows that the net cost of gas was £156,279, or 20·734d. per 1000 cubic feet sold, compared with £156,765, or 18·41d. per 1000 feet sold, in the previous year.

BELFAST CORPORATION GAS UNDERTAKING.

Annual Report and Accounts.

The report of the Belfast Corporation Gas Committee on the accounts for the year ended March 31 is to the effect that the gross profit on the manufacture and sale of gas and residuals is £84,001, which is an increase of £38,902 as compared with last year. Adding the rents received from property purchased for gas-works extension (£181), and the profit on the working of the stove department (£812), there is a total gross income of £84,994. From this have to be deducted dividend and interest charges, leaving a net profit of £62,428, which is £36,698 more than last year's net profit. When to the sum named there is added the balance of £12,097, the amount brought forward from last year, there is a total at the credit of profit and loss account of £74,525. From this there are deducted the following items: Amount carried to sinking fund, £8889; cost of issue of stock, £269; amount carried to reserve for insurance of works, £1600; amount carried to reserve for contingent renewal fund, £3000; and amount carried to reserve for remodelling the water-gas plant, £10,176—leaving a balance of £50,591, out of which there has been contributed £10,000 in aid of rates, and £11,344 dividends and sinking fund on the City Hall stock, leaving a balance to be carried forward of £29,246.

The following table shows the profits made [omitting shillings and pence] since 1875, and their allocation:

Total gross profits, 1874-1916	£2,100,252
Less interest and dividends	650,798
Net profits	£1,449,454
Allocated as follows:	
Sinking fund	£245,524
Extension of works, &c.	494,554
Depreciation	111,232
Reserve funds	137,210
Extinction of retort-house stock	2,874
Cost of issuing stock	13,070
Arbitration, Belfast Corporation Act, 1912	1,394
	£1,005,858
Payments to City Council:	
General purposes fund, in aid of rates	£197,500
Dividends and sinking fund, New City Hall	157,419
Parks Committee	3,914
Library Committee	9,550
Baths Committee	600
Electric Committee	40,573
Dials for Memorial Clock	300
Temporary Albert Bridge	3,500
Cost of Finance Bill, 1889	994
	£414,350
Balance at net revenue, March 31, 1916.	£29,246

Alderman JAMES CRAIG, J.P. (in presenting the minutes of the Gas Committee to the members of the Borough Council yesterday), called attention to the fact that, in spite of the many difficulties with which they had had to contend during the past twelve months, the gross profit amounted to £84,001. After deducting dividends and interest on the capital and redeemed stock, there was a net profit of £62,428, out of which they were handing over £10,000 to the Finance Committee in aid of the rates, and £11,344 to pay the dividends and sinking fund on the City Hall stock. Considering the heavy increase in the price of coal and general stores, he thought this result was very satisfactory. Unfortunately, the prospects for the coming year were not at all bright. They had again to meet a very considerable increase in the price of coal; the extra cost amounting to almost £50,000. The Committee were very desirous not to increase the price of gas any further; and with the aid of the balance of £29,246 being carried forward to next year, and by strict economy in outlay, they hoped it would not be necessary to make any change. It must be remembered that, in addition to the extra cost of stores, the expenses had been heavily increased by payments of war bonuses, and allowances to dependants of men who had joined the army and navy—the total amounting to £5116. The interests of the consumers, however, must be the first consideration; and in view of the heavy increase in cost of living, the Committee were anxious not to add any further to their burdens. In order to make the position clear, he pointed out that, while the price of gas in 1904 was 2s. 3d. per 1000 cubic feet, to-day it was only 2s. net. The contract price of coal in 1904 was 13s. 2d. per ton; while contracts for next season would be over 30s. per ton. It would thus be seen that, while they were paying more than double the price for coal, gas was actually being supplied at 3d. per 1000 cubic feet less. In 1904, the amount allowed off gas accounts as discount was £11,200; while for the year just ended it was £44,000—an increase of almost 300 per cent. These figures would prove that the interests of the consumers were not being neglected. The past year had been a very trying one, and it was quite certain that the present one would be even worse. It must not, however, be supposed that the strict economy being exercised would interfere with the efficient upkeep of the plant and machinery, which was now in first-class order. The vertical retort benches and telpher plant had been largely instrumental in obtaining the satisfactory results mentioned. As soon as they were able to get their present contracts finished and at work, he was hopeful of further reducing the working costs. There was still some plant to provide, so as to cope with the demand for gas; but in view of the present state of the Money Market, they would have to wait until the termination of the war. A large and excellent business was being done in the sale of gas cookers, heaters, and hot-water circulators; and with coal at present prices, the ratepayers were finding it economical to use gas for these purposes. Even with coal at normal rates, gas was still the most economical medium for lighting and heating. Every attention would be paid to the needs of the customers, and nothing would be left undone to give them an efficient and cheap supply of gas. He wished to take this opportunity of thanking the Engineer (Mr. James D. Smith) and staff, and all the employees, for their attention to the interests of the concern during the past year. The very excellent results obtained had only been made possible by the harmonious working of everyone, and by the spirit of goodwill shown throughout the Department.

WALSALL MUNICIPAL UNDERTAKINGS.

Profit and Loss.

At the Monthly Meeting of the Walsall Town Council, the Gas Committee reported that the statement of accounts of the undertaking for the past financial year showed a net profit of £7563, as compared with £7694 for the fifteen months ended March 31, 1915.

On the other hand, the accounts of the electricity undertaking for the past twelve months show a loss of £899, which the Committee recommend should be defrayed out of the reserve fund; reducing the sum remaining in this fund to £26. Various causes are stated to have contributed to this loss; one of them being that a new generating station, which should have been completed by June of last year, was not yet finished. The Chairman of the Committee declared that if they raised their tariffs, it would be disastrous to the undertaking; and the only way to meet the extra expenses was to increase the output. It was pointed out that the charges for current for lighting had already been raised 25 per cent.—from 4d. to 5d. per unit; while the power charges were also advanced about two years ago. One member added that the rates for traction purposes at Walsall were also very high; and it might well be argued that the Tramways Committee were subsidizing the electricity undertaking to the extent of over £1000 a year. Looking at the matter in this way, the deficit, instead of being £900, would be nearly £2000. As was quite natural, when the matter was discussed more than one councillor referred to the difference in the results shown by the gas and the electricity undertakings. The former is a source of gratification to all concerned; while the latter, from which better things are hoped when the transition from old to new works is completed, must meanwhile remain a source of considerable anxiety to the Council and the ratepayers.

Newcastle Gas Bill.—Mr. Johnstone Wallace, in presenting to the Newcastle City Council the report of the Finance Committee relative to the Newcastle-on-Tyne and Gateshead Gas Company's Bill, pointed out that the Committee did not approve of the proposal to raise the maximum interest payable on debenture stock from 5 to 6 per cent., and, further, that the financial clauses as amended before the Lords Committee did not, in the view of the Committee, carry into effect the arrangements arrived at with the Company. The Bill had passed the House of Lords, and had been read in the House of Commons a first time. In order that the Corporation should have *locus standi*, the Committee asked for a petition against the Bill to be signed. This course was agreed to.

EDINBURGH AND LEITH GAS COMMISSIONERS.

Automatic Lighting of Public Lamps—Annual Sale of Gas.

At a Meeting of the Works Committee of the Edinburgh and Leith Gas Commissioners held last month, an interesting report by the Engineer (Mr. Alexander Masterton) on the automatic lighting and extinguishing of the public lamps in the city was considered.

Mr. Masterton remarked [considerations of space compel us to condense] that, with reference to the proposal to fit up a trial installation of automatic pressure-wave controllers of the Alder and Mackay type, an intimation was made to the Corporation that the Commissioners were willing to co-operate in the carrying out of the experiment. The amount of additional pressure required to manipulate the apparatus was ascertained, and it was now desirable to make further tests to determine the total extra pressure required at each governor to reach all the lamps controlled by it, and also what effect this would have on the consumers' meters and lighting appliances. At a conference between representatives of the Corporation, the makers of the controllers, and himself, the only difficulties that were anticipated had reference to the effect of the additional pressure on wet meters and water chandeliers. The number of wet meters in use was about 2300: and the cost of replacing these with dry meters was estimated at £3800. The number of water chandeliers fitted up in Edinburgh was about 20,000; and it was felt that considerable danger would arise unless their seals were made secure against the extra pressure—work which would involve an outlay of about £550. It was suggested by the Corporation representatives that this outlay should be borne by the Commissioners, who should also be liable for accident or damage.

It having been suggested at the conference that information should be obtained from towns where automatic lighters are used, the Gas Engineers of Newcastle, Swansea, and Belfast were communicated with. The replies were as follows: Newcastle: No wet meters. The Engineer considers they are a danger where the pressure-wave system is employed. Consumers were notified that the Company would, at a nominal figure, convert chandeliers into fixed pendants. Later, this was done free—many taking advantage of the offer. Swansea: No wet meters; but many water chandeliers. No special attention was given to the latter; and the Engineer was not aware of any accident directly due to the pressure-wave system. Belfast: No trouble was experienced either with wet meters or chandeliers.

As the Corporation desired an early test, the Commissioners might consider the advisability of making an experiment with 200 controllers (to be supplied free by the makers, and fitted up by the Corporation), without alteration to the present system. If it should be decided to proceed with the experiment, it would be necessary to continue it into the winter months, in order that the full effect of the extra consumption at that time could be taken into account in imposing the pressure wave, and in determining the time in relation to sunset when the additional pressure would be required, so as to bring about the greatest possible saving.

The Committee authorized the suggested experiment.

At the Commissioners' meeting on Monday of last week, the Convener of the Works Committee stated that the experiment was proceeding. Bailie Stark considered it unfair that the cost of replacing the wet meters should stand against the proposal, because the Consulting Engineer (Mr. W. R. Herring) had said that these meters would have been removed had it not been for the war. On his suggestion, the report was recommitted for further consideration.

Annual Cash Receipts and Sale of Gas.

It was reported by the Treasurer (Mr. A. Canning Williams) that the total cash receipts for the year ended May 15 last amounted to £403,595—an increase of £42,707 on 1914-15. The increase was made up as follows: Ordinary consumers, £22,218; prepayment consumers, £3334; residuals, £11,529; fittings, &c., £5566. The number of payments was 350,817, of which the collectors received 76·17 per cent. He also stated that the quantity of gas sold during the year was 1,949,414,000 cubic feet, value, £297,169—a decrease in the quantity of 38,914,500 cubic feet (1·96 per cent), and an increase in the value of £34,691. The gas used by the public lamps and stair-lights showed a falling-off of 62,744,800 cubic feet. If they had consumed the same quantity as in 1914-15, there would have been an increase in the total sale of 1·2 per cent.

COVENTRY GAS-WORKS ACCOUNTS.

The annual report relating to the Coventry gas undertaking, some figures from which were given on p. 697 of last week's "JOURNAL," came before the City Council at their meeting on Tuesday.

Mr. QUINNEY, who moved the adoption of the report, described the result of the year's trading as marvellous, in view of the conditions under which they had had to work. Normally about 360 workmen were employed at the Foleshill and Coventry works; but the changes of workmen had been very great. No fewer than 541 had left since the outbreak of the war, and 529 had been engaged. This meant that large numbers had left to go to other works, and had to be replaced. It spoke well that, under such circumstances, Mr. Langford (the Works Manager) had been able to keep the works going as well as he had done. Some forty or fifty women were employed at the Foleshill works in washing coke and loading it into railway trucks, &c.; and most of the collecting from the slot-meters was done by females. Very great difficulty had been experienced in obtaining the coal needed for the ensuing year; but they had now purchased what was thought to be sufficient to meet requirements over next winter, provided full deliveries were obtained. The price, however, had steadily increased since the war; the average price of new contracts being 22s. 2d. per ton, compared with 15s. 5d. the previous year. This meant that £20,500 extra cost would have to be borne next year for coal only. While the increase in the manufacture of gas for the twelve months 1914-15 was 2·65 per cent., or 28 million cubic feet, they were able to report that there was nearly 15½ per cent., or 168½ million cubic feet, increase for the year just closed. This increase, nearly six times as great, yielded an additional revenue of £24,564. Of this sum £14,265 was directly due to increased consumption, and £10,300 to the 2d. per 1000 cubic feet extra charged for gas. This vast increase of output could not continue very long before extensions at the works would become imperative. The present works at Foleshill were brought into operation in 1908; their total producing capacity being 5½ million cubic feet per day. The maximum delivery of gas last winter was 5,177,000 cubic feet per day; so that the full capacity of the plant was nearly reached. The Works Sub-Committee had this matter under very careful consideration. Ordinary consumers had been supplied with 791,892,900 cubic feet of gas during the year, and prepayment consumers with 444,567,300 cubic feet. Some 2½ years ago, the Committee were recommended by the Engineer (Mr. F. W. Stevenson) to put down plant for the extraction of cyanide from the gas. The recommendation was acted upon, at a cost of £2678. It was anticipated that the profit made would pay off the cost of the plant in three years; but owing to the increase in value of cyanide, due to the war, last year a profit was made of £1954. During the year now under consideration, the balance of the cost of the plant had been paid out of profits; and, in addition, £853 profit on cyanide had found a place in the list of residual products. This was a very gratifying result. The toluol plant was neither a means of profit nor loss to the department; the Government paid the costs, and were satisfied with the results. The increased value and extra quantity of residual products had yielded £24,626 more revenue.

After some discussion, the report was adopted.

RIPON GAS-WORKS SCHEME.

Mr. Edward Taylor, the Chairman of the new Gas Committee at Ripon, has resigned his seat on the City Council. In a letter read to the Corporation last week, he stated: "While neither accepting nor disputing the idea that I have lost my qualification to sit as a Councillor, I again ask that the Council may relieve me of my responsibilities, and trust that the urgent work of renewals at the gas-works will not be retarded thereby."

Alderman WALKER, in moving that Mr. Taylor's deposit of £5 should be remitted, said the Gas Committee had lost the services of a very able member and, he thought, a very able Chairman.

Alderman METCALFE, who seconded, said they were losing a good man, one who would have been in the right place as Chairman of the Gas Committee.

The resignation of Mr. Taylor, whose removal out of the city caused his qualification to be questioned, was accepted, and the deposit was remitted.

The MAYOR (Mr. F. W. Hargrave), in moving the confirmation of the minutes of the Gas Committee, proposed that an additional twenty guineas should be paid Mr. J. W. Dunn, the Consulting Engineer in connection with the abandoned gas-works improvement scheme, in settlement of any claim he might have against the Corporation. Mr. Dunn had applied for an allowance for extra services.

Mr. KEARSLEY seconded; but the motion was lost by seven votes to three.

The MAYOR pointed out that Mr. Dunn had already received about 50 guineas.

It was eventually agreed to ask Mr. Dunn to attend a meeting of the Gas Committee or send in a detailed report of the extra services rendered in justification of his account for £36 15s.

The Council confirmed a recommendation of the Gas Committee that the amount asked for should be paid to Mr. W. Doig Gibb, for his special report upon the tenders for vertical retorts.

TRIBUNALS AND EXEMPTION APPLICATIONS.

The Lynn Gas Company applied for the exemption of a man 36 years of age, a gas-fitter and main and service layer. The man was stated to be the only one left who did this particular work. Prior to the war there were four men engaged; but three were now serving in the forces. Of eleven out-door men, nine had gone into the army. Conditional exemption was allowed.

At the Ripon City Tribunal last Friday, the Corporation Gas Manager (aged 35) applied for conditional exemption on the ground that it was expedient that he should continue in his present employment. He pleaded that it was absolutely necessary that some responsible person should be in charge of the gas and sulphate works, and added that he was desirous of obtaining an extension beyond the termination of his appointment with the Council, in order that he could make his own arrangements. He left the Corporation on Aug. 10. Exemption to Sept. 1 was granted. The Gas Manager also appealed for exemption for a clerk (aged 31) at the gas-works. It was stated that the clerk would be of great value to the incoming Manager of the gas-works. Exemption to Nov. 15 was granted.

The Normanton Tribunal has granted exemption to the Normanton Gas Company's accountant and chief clerk, the maintenance fitter, and a fitter, on condition that the Manager carried out his undertaking to release his assistant, who was a single man, and asked the Ministry of Munitions to withdraw his badge.

The case of a plumber, gas-fitter, and sanitary engineer, who at the previous sitting of the Tribunal claimed to be the sole remaining plumber in South Bank, but was only allowed one month, again came before the Tribunal, having been referred back by the County Tribunal. An extension was allowed to Jan. 1.

At Southend, the Water Company applied for the exemption of four plumbers and waste inspectors, and two engine-drivers at the pumping-station. Mr. C. S. Bilham (the Secretary and Manager) said with regard to the plumbers it was most important that the Company should retain the men engaged in this branch of their business, both in their own interest and that of the consumers of water. The plumbers

not only had to do repairs work for the Company, but, under the authority of the Act of Parliament, they made repairs to consumers' fittings. There was now a shortage of such men in the district. The plumbers also carried on inspecting work; and the inspections for 1915 numbered over 60,000. The total number of fittings throughout the district was, roughly, 176,000; and defects discovered during 1915 were 22,959, of which 462 were pipes leaking underground. It was of vital importance that waste should be prevented; and this could only be done by constant inspection to detect it and to secure prompt repair of water-fittings when waste was discovered. Conditional exemption was granted; and Mr. Bilham said he would encourage the staff to join the volunteers.

Before the Eston (near Middlesbrough) Tribunal, last Tuesday, an application was made for the exemption of seven employees of the Gas Firing Company. It was stated that the men were engaged in blast-furnace building and repairs to munition works. A representative of the firm produced a letter from the Ministry of Munitions stating that the men were entitled to badges, and the cases were adjourned to allow the firm the opportunity of obtaining them.

At the Southwark Tribunal, Messrs. A. C. Potter and Co., artesian well engineers, of Lant Street, S.E., applied for the exemption of eleven employees, nine being foremen of borings for water supply, and the other two assistant foremen. It was stated that one man had enlisted since his application was sent in; and his claim was withdrawn. The firm had 94 men at the outbreak of war; and 38 had joined the forces. They were engaged on Government work; and some of their men were badged by the Minister of Munitions. These were all experienced borers, who had been in their employment for some years; and they had called in the services of some of their old borers, who had left their service, to assist them. The boring business had gone: but they required these men for extension and maintenance of water-works in various parts of the country. They were granted conditional exemption, with the exception of the youngest man, whose application was refused.

Automatic Street Lighting at Walthamstow.—The Walthamstow Urban District Council have been recommended to purchase 1150 Broadberry controllers for the automatic lighting and extinguishing of the public gas-lamps in the district, at a cost of 38s. per lamp.

Gas Matters at Tottenham.—As the Tottenham District Council refuse to make an increased payment to the Tottenham District Light, Heat, and Power Company in respect of lamps remaining in lighting under the existing contract, the Company have asked the Council either to cancel the contract or agree to the question of the lighting charges being referred to arbitration. The Council have been recommended to direct the Solicitor to ask the Company to state precisely what matters they desired to be submitted to arbitration. The Company have withdrawn their application to the Council for permission to utilize Page Green Common for the erection of a high-pressure gas station.

WHAT ITEMS SHOULD DETERMINE THE PRICE CHARGED FOR GAS?

An American View.

In the March issue of "Current Opinion" [an American publication] there appeared, under the title "Putting Cheap Gas on the Map," an article which gave a very misleading impression as to the possibility of selling manufactured gas at low prices for domestic purposes. An able refutation of it, from the pen of Mr. Alfred E. Forstall, was published in the last issue to be received of the "American Gas Institute News."

He wrote: In the article, the existing regulations as to quality established by Municipal Authorities, State Legislatures, and Public Service Commissions are set forth as practically the only obstacle in the way of selling for house heating, at a price of from 30c. to 50c. per 1000 cubic feet, gas distributed from central stations. The author seems to think that if gas could be sold at the price, it would entirely displace coal for domestic heating purposes—to the great benefit of the community; and that, because of preventing this desirable consummation, the regulations are very detrimental to the public welfare.

The burden of the argument seems to be that the existing regulations necessitate putting into the gas, at great expense, hydrocarbons which, while valuable from the standpoint of the illuminating value when the gas is burned in ordinary flat-flame or argand burners, are very detrimental to the use of gas as fuel—in fact, it could very easily be understood from the article that the constituents which the gas must contain in order to have a high illuminating value actually reduce its value for heating purposes. This is not the case; since these constituents do increase the calorific value, although not in proportion to their cost. The chief disadvantage connected with their presence is that it renders more difficult the efficient consumption of the gas in the atmospheric burners which are ordinarily used in appliances for cooking, for heating houses from a central point, and for industrial purposes.

In much the largest portion of the United States, however, the regulations call only for a calorific value standard; and while the standard of 600 B.Th.U. cubic foot usually specified is, as a general rule, not as economical all round as would be one of 550 B.Th.U., or possibly of 500 B.Th.U. per cubic foot—the difference in cost between a gas of 600 B.Th.U., and one even of 500 B.Th.U. would not be sufficient to make it possible to sell gas for house heating or other domestic purposes at any such average price as 30c. per 1000 cubic feet. In one case where the Public Service Commission was persuaded to reduce the quality required from 600 B.Th.U., as originally fixed, to 560 B.Th.U., the difference in cost at the burner between gases having calorific values of 605 B.Th.U. and 560 B.Th.U. respectively

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worked out as 0·083 c. per 1000 cubic feet, and the number of British thermal units which could be purchased for $1 was about 1 per cent. greater for the gas of lower quality.

The writer of the article seems to have assumed that an increase in the amount of gas sold will, of itself, materially decrease the cost at the consumer's burner. An increase in the amount made does not affect the manufacturing costs to any appreciable extent after the plant has once reached the size already attained in the larger cities of the country; while a decrease in the distribution costs results from an increase in the sales per consumer, rather than from an increase in total sales.

The cost per consumer of getting the gas from the holder to the burner varies very little with variations in the amount of gas used annually per consumer. If, therefore, the average amount of gas sold per consumer could be increased from (say) 25,000 to 150,000 cubic feet per year without altering the other conditions, the cost of getting the gas from the holder to the burner per 1000 cubic feet could be reduced to about one-fifth of its original amount. This reduction would amount, at the most, to less than 0·16 c. per 1000 cubic feet in the case of companies now selling gas at 80 c. per 1000.

In addition to the manufacturing and distribution costs, there must also be considered the investment costs. Because of the large investment required per 1000 cubic feet of daily sendout, the ratio between the annual sales and the maximum day's sendout is a very important feature in the cost of gas. The higher this ratio, the smaller the investment charges per 1000 cubic feet of gas sold. Unfortunately for the argument of the writer of the article, the load-factor of the house-heating business is a very poor one. When gas companies did only a lighting business, the annual sales were about two hundred times the maximum day's sendout. As sales for cooking and industrial purposes have been developed, the ratio has increased until now a number of gas companies will show annual sales of 240 times, in some cases even 260 times, the maximum day's sendout. These better load conditions belong, however, to companies which do little, if any, house-heating business. Companies selling manufactured gas in southern cities which, because of local conditions, do a comparatively large amount of house-heating and natural gas companies, which can sell gas at a price that makes it available for house heating, have total annual sales amounting to only from 150 to 170 times the maximum day's sendout.

In the case of an individual experiment of house heating by gas used in a hot-air furnace, it was found that the total annual consumption was only 70 times the maximum day's consumption; and it is doubtful if the house-heating business as a whole would show total annual sales of more than 100 times the maximum day's sendout. The peak of this load comes at a time when the use of gas for other purposes is also near its maximum; and, therefore, extra manufacturing apparatus must be provided to take care of this peak. The necessity of paying interest and depreciation on this apparatus makes it absolutely impossible to sell any kind of manufactured gas for house-heating purposes at any such average price as 30 c. to 50 c. per 1000 cubic feet.

In a rate case before a Public Service Commission, the value of the economically built carburetted water-gas manufacturing plant of the company, including holders, was fixed at a total that worked out to $220 per 1000 cubic feet of the maximum day's sendout. The value of the street mains, services, and meters forming the distribution system was fixed at a total equal to $506 per 1000 cubic feet of the maximum day's sendout. This latter value would be reduced if a house-heating business were done; but that of the manufacturing plant and holders would remain the same. A valuation of the property of a natural gas company, which did a large house-heating business and had sales per customer much larger than the average natural gas company, showed a total value in street mains, services, and meters of $66 per 1000 cubic feet of the maximum day's sendout for domestic consumers —the latter being estimated as closely as could be done. This would give a total value of manufacturing plant and distribution system of $286 per 1000 cubic feet of maximum day's sendout for a company selling manufactured gas with a large house-heating business. Taking the total annual sales for house heating as being 100 times the maximum day's sendout, the value per 1000 cubic feet of annual sales for this business would be at least $2·86. The return on value and depreciation should not be less than 10 per cent. of the investment, and would therefore amount to a minimum of 29 c. per 1000 cubic feet of gas sold. The cost of manufacture and the cost of distribution would certainly bring the total cost above 50 c. per 1000; and even at a price of 50 c. it would be impossible to secure the amount of business that would be necessary in order to make the investment charges as low as has been assumed.

It may be claimed that the above discussion deals solely with carburetted water gas, and that coal gas can be manufactured more cheaply than carburetted water gas. This does not alter the final result, since the plant for manufacturing coal gas cannot be installed at as low a cost per 1000 cubic feet of the maximum day's sendout as has been assumed above, and the extra investment charges entailed by the use of a coal-gas plant would largely offset the cheaper cost of manufacture, leaving the total cost of gas delivered to the consumer practically the same.

Looking at the matter from the standpoint of the number of heat units that can be purchased for $1, it can be shown that there is no very great amount of difference between varying qualities of gas. As has been previously mentioned, in one case the change from 605 to 560 B.Th.U. produced a difference in cost of 0·08 c. per 1000 cubic feet and an increase of 1 per cent. in the number of British thermal units that could be purchased for $1. The chief advantage to be gained from a reduction in the quality of the gas would be an increase in the efficiency of combustion; but this probably would not amount to more than 10 per cent., and would not be sufficient to make possible the use of gas for general house heating.

What has been said above applies to the sale of gas at a flat-rate per

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1000 cubic feet. If the "readiness-to-serve" and consumers costs, which do not depend upon the amount of gas sold but are incurred even when no gas is sold to a consumer connected to the system, are taken care of, either by demand and customer charges or by a suitable price per 1000 cubic feet for (say) the first 5000 or 10,000 cubic feet consumed per month, the charge per 1000 cubic feet of either all the gas consumed or of the gas consumed in excess of the primary amount, can be made low—possibly in some cases even as low as 30 c. per 1000 cubic feet. This is because the price for this gas does not have to include either the return on investment or a large part of the cost of getting the gas from the holder to the burner. In no case, however, can the average price of all of the gas used by any customer be made as low as the figures named in the article under consideration.

There is, however, a large field for the use of gas for house heating during the fall and spring months, when it is necessary only to take the chill off in the morning and not to keep up a supply of heat during the whole day. Under these conditions gas even at the price of $1 per 1000 cubic feet is a cheaper heating agent than either coal or coke at ordinary retail prices. There is also a field for the sale of gas for house heating, at prices that are possible, to a number of persons in every community who are able and willing to pay for the greater convenience and comfort secured by the use of gas as compared with that of solid fuel.

AN ARBITRATION AS TO THE PRICE OF WATER.

In the "JOURNAL" for April 11 we reported that an arbitration was held at the Surveyors' Institution, Great George Street, before Mr. G. I. Talbot, K.C., to determine the price at which the Bradford Corporation are to supply water in bulk to the Spenborough Urban District Council for the purpose of distribution by the Council in two townships —Cleckheaton and Gomersal, which now form part of the area of the urban district.

Mr. E. HONORATUS LLOYD, K.C., and Mr. F. G. THOMAS (for Mr. H. W. BEVERIDGE, on active service), instructed by the Town Clerk, appeared for the Bradford Corporation. Mr. E. F. VESEY KNOX, K.C., and Mr. W. E. TYLDESLEY JONES, instructed by Mr. W. H. Clough, solicitor, and Messrs. Torr, Durnford, and Co., appeared for the Spenborough Council.

The price at present paid by the Council is 9d. per 1000 gallons; and the Bradford Corporation put forward the price of 10d. per 1000 gallons as a fair one, while the Spenborough Council claimed that 6d. per 1000 gallons was the price which the Corporation were entitled to be paid.

The arguments in support of these contentions were set out in the report referred to [April 11, pp. 96 and 97].

The ARBITRATOR has now issued his award in the following terms:

> "I settle the said price at the sum of 7d. per 1000 gallons; and I declare that the said sum is intended to represent the cost to the Corporation of the water supplied by the Corporation to the Council, including payments to sinking-fund in respect of loans, but without any addition in respect of risk, profit, or otherwise."

The other conditions of supply were settled by agreement, and incorporated in the award.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 3.

A good deal of interest is being taken in pitch for forward delivery, as might be expected at this time of year. Freight, however, is a great difficulty. Deliveries of tar for home use continue satisfactory. Current values of products are as follows: Pitch, 19s 6d. to 20s. per ton in bulk. Creosote, 4d. to 4⅛d. per gallon in bulk. Solvent naphtha, 90-160, 2s. to 2s. 1d. per gallon, naked. Anthracene, 48-50 per cent., 3d. per unit, casks free. All the values are at makers' works, net cash. The price for 60's crude carbolic acid continues to be 3s. 4d. per gallon, in sellers' tank-trucks, at sellers' works, net cash.

The position of sulphate of ammonia is improving, and there are buyers up to the end of the year; but makers are still looking for higher values.

Tar Products in the Provinces.

July 3.

There is no material alteration in the markets for tar products. In pitch the price remains the same, and no business of great importance is reported. Some transactions are reported in solvent naphtha at slightly lower prices. Heavy naphtha is in fair demand. Creosote is still very quiet.

The average values of gas-works products during the past week were: Gas-works coal tar, 15s. 3d. to 19s. 3d. Pitch, East Coast, 15s. to 15s. 6d. per ton; West Coast, 14s. to 14s. 6d. Manchester, 15s. to 15s. 6d. Liverpool, 17s. to 17s. 6d. Clyde. Benzol, 90 per cent., North, 10¼d. to 11½d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¾d. to 7d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2¼d. to 2½d. Heavy oils, in bulk, 3¼d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene, salts, 80s., bags included. Anthracene, "A" quality, 2d. to 2½d. per unit; "B" quality, nominally ⅜d.

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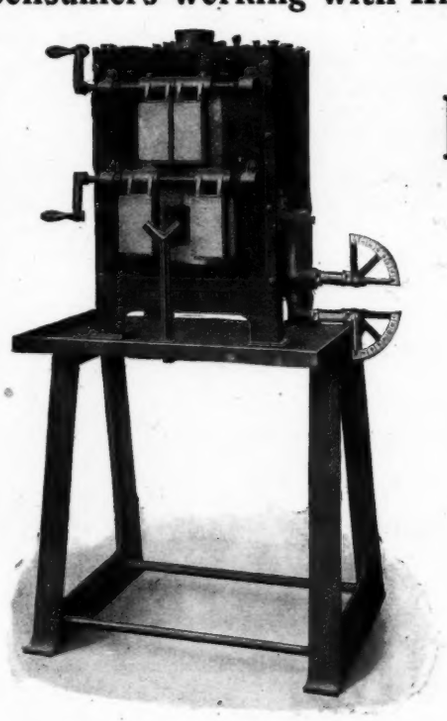

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Manchester Tar Prices.

The average prices realized for tar—based on the value of the products—for April and May deliveries in the Manchester district were as follows: April, 21s. 7d. per ton; May, 21s. 6d. per ton.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *July* 1.

Throughout the week the tone of the market has continued very firm, and a further increase in values has taken place. The volume of export trade has been curtailed by the difficulties in effecting shipments, but there has been a renewed good demand for munition purposes. The closing quotations for prompt delivery are £17 per ton f.o.b. Hull, £17 5s. f.o.b. Liverpool, and £17 7s. 6d. f.o.b. Leith. In the forward position, £17 10s. per ton f.o.b. Liverpool has been obtained for July-December delivery, and it is reported that this price has been refused at Leith over the same period.

Nitrate of Soda.

The market for this article is again a little weaker on spot, and there are now sellers at 18s. per cwt. for ordinary, and at 18s. 9d. for refined quality.

Sulphate of Ammonia.

From another source it is stated there is practically no alteration in this article. Prices are as follows: Outside London makes, £16 15s.; Hull, £16 12s. 6d.; Liverpool, £16 15s. to £16 17s. 6d.; Leith, £16 17s. 6d.; Middlesbrough, £16 15s.

COAL TRADE REPORT.

Northern Coal Trade.

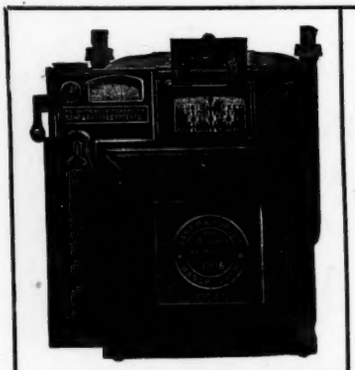
The coal trade is still influenced by the lack of ready steamers, but there is generally a good demand, though the prices vary according to the period of shipment probable. The steam coal trade continues quiet, though tenders have been sent in for some 15,000 tons for Norway, to be shipped during the next month. Best Northumbrian steams are from 50s. to 55s. per ton f.o.b.; second-class steams are 45s. to 48s. per ton, though it is considered that rather less might be taken to secure early tonnage; and steam smalls are quiet at 28s. to 32s. per ton. The demand is full for July loading; but the steamer supply is not quite so promising as the steady output makes needful. In the gas coal trade, there is the more ready granting of licences for export to Italy. But the scarcity of steamers is felt here also; and where the difficulty is met, it is sometimes accompanied by claims for concessions in the price. For best Durham gas coals, the current quotation is from 35s. to 36s. 6d. per ton f.o.b.; second-class kinds are from 33s. to 33s. 6d. per ton f.o.b.; and "Wear Specials" vary from 37s. 6d. to 38s. 6d. per ton f.o.b. There is not much doing in new contracts for gas coals, but deliveries seem to be a little better. Freights are still high however—from 12s. to 12s. 6d. being the rate quoted for gas coal, Tyne to London, according to the size of the steamer. In coke there is not so much doing; but some large sales of coking coal are being negotiated for Spain, which may affect the market. Good gas coke is naturally in small supply at this time of the year; so that the price continues firm—from 30s. to 32s. per ton f.o.b. in the Tyne being the current quotation.

Gas Testing.

In the report of the Public Control Committee to be considered at the meeting of the London County Council to-day, the following item appears in regard to gas-testing: The gas supplied by the Commercial Gas Company and the Gas Light and Coke Company at one testing-station each in April and May, 1915, was found to be deficient in illuminating power and calorific power respectively. Appeals which were lodged by the Companies were heard by the Chief Gas Examiner on May 16, 1916. Under his award, dated May 24, 1916, the Chief Gas Examiner decided that the deficiency in the illuminating power of the gas supplied by the Commercial Gas Company at the Parnell Road testing-station on April 2, 1915, might be traced to difficulties arising out of the war, and the report was accordingly cancelled. A forfeiture of £5 was, however, imposed on the Gas Light and Coke Company in respect of the deficiency in the calorific power of the gas supplied at the Lambeth Road testing-station on May 28, 1915.

Tipton Gas-Works Plant.—It was reported by the Gas Committee at a meeting of the Tipton Urban District Council last Tuesday that the carbonizing plant was being thoroughly overhauled, and that it was proposed to complete the reconstruction of the remaining four beds of retorts on the horizontal system this year. The outlay involved is something like £2000; but the Committee stated that it was absolutely necessary, in view of the number of new industries that are springing up in the district.

Rochdale Gas-Workers' Wages.—It was reported at a meeting of the Rochdale Corporation Gas and Electricity Committee that a letter had been received from the Gas-Workers' Union asking for further advances of wages to varying grades of men employed at the gas-works. The application embraces most of the employees of the department; and it was referred to the Works Sub-Committee for consideration and report. It was stated that the increases asked for would mean an extra cost to the department of about £900 a year. In January last advances amounting to £400 a year, or with bonus £800, were granted.



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Nottingham Water Undertaking.

The burden entailed upon Nottingham by the Derwent Valley scheme, in which it participates with the municipalities of Sheffield, Derby, and Leicester, is again reflected by the annual report of the Water Committee, which has just been completed for presentation to the City Council. There had been so many complaints as to the deleterious effect of the water upon piping, that the supply was for a time altogether discontinued—hope being expressed by the Chairman of the Committee that there might yet be found somebody willing to free the city of their obligations in relation to the Derbyshire project. But as this very remote contingency is as far as ever from being realized, it is recognized that the price is too large a one to pay without something in the nature of a return. It is now, therefore, reported by the Committee that they have made all necessary arrangements to utilize the water available from the Derwent source; the anticipation being that this will materially reduce the fuel costs under the heading of pumping expenditure. Precepts amounting to the sum of £108,704 have already been paid to the Derwent Board. Designs and contracts have been made for the installation of a mechanical filtration plant at Eastwood to treat the Derwent supply; and the Committee hope that in their next statement they may be able to announce that the scheme is in actual operation. There have been many difficulties and delays; but now that the contract has been definitely entered into, it is expected that the work will go steadily forward. After making provision for all changes, there is a small debit balance on the year's working of £260. The report of the Engineer and Manager (Mr. F. W. Davies), the value of whose services is warmly acknowledged by the Committee, states that the estimated population within the area supplied on March 23 last was 372,978; and the population of the parishes supplied in bulk through meters outside the statutory area is estimated at 4000. The quantity of water received from the Derwent Valley Water Board during the past year has been 42,175,000 gallons. The total quantity of water distributed from all sources amounted to 3,160,715,112 gallons. The total number of supplies on March 23 was: Domestic, 146,928; trade, 17,171.

Concessions to Liverpool Water Consumers.—The Liverpool City Council recently met the expressed views of the ratepayers by allowing them to substitute iron valves in place of lead and copper ones in flushing cisterns. The advantages were a saving of two-thirds of the cost, and the removal of the incentive to theft—the iron valves being unsaleable to receivers of stolen property. A more recent concession has been the affixing of washers to water-taps by the inspectors, instead of the expensive procedure of serving notices to renew. In view of this treatment, it is now proposed to ask the Council for permission to supply galvanized iron tanks in place of lead or copper—the pipes to remain of copper or lead. Already such a concession has been made by the Nottingham Corporation to the local Owners' Association.

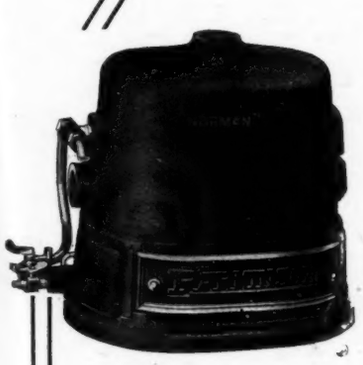
Tar Oil for Diesel Engines.—In consequence of the high price of fuel oil (£8 16s. 3d. per ton), the Gillingham Town Council have referred to a Committee the question of using tar oil at the electricity works; the cost being 80s per ton, and the efficiency 10 per cent. less than with ordinary fuel oil. About 500 tons per year are consumed; and with the use of tar oil it is calculated that there would be a yearly saving of £2200, while the cost of the necessary apparatus for the two engines would be just over £500. On the same subject, at the last meeting of the Diesel Engine-Users' Association, a motion by Mr. H. Leslie Dixon, seconded by Mr. C. O. Milton, that the Association should support the application of the Suffolk Electricity Supply Company to the Board of Trade for the voiding or suspension during the war of the German patent in regard to "Improvements in internal combustion engines," to enable tar oils to be used as fuel—was discussed. It was pointed out that, although at present any royalties would be paid to the Public Trustee, the Germans might eventually benefit as a direct result of the war in consequence of the increased price of crude petroleum oil which led to the present demand for tar oils as fuel for Diesel engines. Further, on public and patriotic grounds, the Association should support any movement which would tend to the preservation and economical use of the coal reserves of the country.

The Mannesmann Tube Works and "Business Loyalty."—Last Saturday, in its "German News," the "Ironmonger" published the following: According to the "Frankfurter Zeitung" of June 17, negotiations have been proceeding for some time past, "at English instigation," concerning the absorption of the British Mannesmann Tube Company by another British firm. The purchase price has not yet been fixed, but it will run into several millions, and it is to be "conveyed to the Düsseldorf Company by contra accounts with another concern." The English undertaking, according to the "Frankfurter Zeitung," was only beginning to be a paying concern shortly before the war; and (as the German Mannesmann Works probably held the whole capital) it represented a rather important foreign member of the Mannesmann organization, although, like other undertakings in which the Düsseldorf Company participates, it is probable that much of the holding had been written-off. The transaction, therefore, if it goes through, will show a profit on paper, against which must be set off the commercial disadvantage of amputation. "What is remarkable in this case, as in other German-English separations of interest (for example in the dynamite group), is that even now the British merchant and the British authorities occasionally display a cool and realistic deliberation and the capacity of drawing the logical consequences therefrom in a loyal and businesslike manner." The "Swansea Daily Post" understands that negotiations are proceeding with a view to the transfer of the British Mannesmann Tube Company to Baldwin's Limited, though for the moment nothing definite can be stated. Inquiries at Swansea show that neither Company has anything to say on the matter. Baldwin's are one of the largest iron and steel firms in the country—owning numerous works and collieries; while the Mannesmann Tube Company are said to employ 1600 men.

PARKINSON'S

"Norman" Circulator

(Cast Iron).



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THERMOSTATIC VALVE.—Prevents waste of Gas.

The Parkinson Stove Co., Ltd. (Water Heater Section),
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Tar Distillation at Dundee.—The Dundee Gas Committee have agreed to recommend the acceptance of a tender amounting to £2160 for rectification plant in connection with their tar distillation works. The new plant will be installed within the present area of the distillation works. The Committee have further decided to acquire additional ground from the Harbour Trustees, to be used in the meantime for storage purposes.

Daylight Saving and Gas Consumption at Skipton.—The Chairman of the Skipton Gas Committee (Mr. E. Wilson) recently reported to the Council that a month's experience of the Daylight Saving Act had resulted in a decreased comsumption of gas of 741,000 cubic feet—the consumption having fallen from 2,765,000 feet to 1,988,000 feet. He referred to this as a very gratifying instance of the beneficial results accruing from summer time.

Newbury Gas-Works.—A gross profit on their gas undertaking for the past year of £3018 has been reported to the Newbury Corporation; this comparing with £4019 a year ago. After payment of interest, income-tax, and sinking fund instalment, there is a surplus of £85, which is to be retained as a working balance. The Committee considered the report satisfactory; and Alderman Lucas, in presenting it to the Council, congratulated the Manager (Mr. W. R. Davey). The make of gas per ton of coal carbonized was 11,240 cubic feet.

Price of Gas at Devonport.—The accounts of the Devonport gas undertaking for the year ended May 31 last were submitted to the Plymouth Corporation Gas Committee last Thursday. The gross profit is £19,159; and, after deducting the charges for interest on loans and sinking fund, there is a loss on the year's working of £738. Last year the gross profit was £22,019, and the net profit £4122. It was decided that, for the meter readings for the quarter ended June 30, the price of gas to ordinary consumers be increased from 2s. 7d. to 2s. 11d. per 1000 cubic feet, the gas supplied through slot-meters reduced from 25 to 21 cubic feet for 1d., and the price for gas for power purposes increased from 2s. 4d. to 2s. 8d. per 1000 cubic feet.

Price of Wolstanton Gas Increased.—The Gas Committee, having reconsidered their proposal to increase the charge for gas by 2d. per 1000 cubic feet, reported to the Urban Council that, owing to the increased price of coal, it was impossible to alter their decision. It was pointed out that the profits of the undertaking last year (£739) were considerably less than the previous year, when a profit of £1330 was shown. Now 50 per cent. more was being paid for coal; and the increase in the price of gas was only 12 per cent. At least £1000 more would have to be provided this year than last year. There was opposition to the proposal; but the recommendation was finally adopted by the Council.

STOCK MARKET REPORT.

LAST week the Stock Exchange made a complete recovery from the little check which had been administered to it; and markets were ebullient with cheerfulness. To begin with, the course of events at all seats of war was regarded as full of promise, and then there was any quantity of money seeking investment and sometimes not finding it. Much went into Treasury Bills and War Savings Certificates, and still there was more than enough in Capel Court. In the gilt-edged department, War Loan, Consols, and Colonials were in great request, and the success of the Australian issue inspired strength. Home Rails had a good time, and consolidated their strength. The Foreign Market was firm—especially for the French Loan; and the last day's prices were the best of the week. Americans were dull at first, but brightened up when the Mexican situation showed a ray of sunshine. Argentines were only moderate, and South African irregular at times. In the Miscellaneous Market, rubber did not effect much improvement in its position, and copper was dullish. But oils did well, and shipping was stronger. Business in the Gas Market was active—the five days of last week presenting transactions equalling in number an average six days week's. And the tendency was all that could be desired pretty well throughout the list, while some issues were strong in advance. Thus Gas Light ordinary and South Metropolitan improved from 1½ to 2 points, Oriental 6 points, and Imperial Continental jumped from 76⅛ on Tuesday to 85 on Friday.

Among other topics of interest, the Government have decided that their invitation (and 2s. super income-tax threat) addressed to holders of Dollar Securities shall extend to the holder of a security of under £1000.

After oft-repeated supplications, the last of the minimum prices have now been removed; the relief taking effect yesterday.

The Committee have resolved to close the Stock Exchange every Saturday in August.

The judgment of the House of Lords against the Continental Tyre Company at last disposes of this German concern.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary, 78, 78¼, 78⅜, ditto maximum 61, ditto preference 75⅝, ditto debenture 59¾, 60⅛, Primitiva 38s. 9d., 39s. 4½d. On Tuesday, Buenos Ayres debenture 62, 62½, Gas Light ordinary 78, 78¼, 78⅜, 78½, ditto preference 76, ditto debenture 60¼, Imperial Continental 76¼, 77½, Sheffield "C" 184, South Metropolitan 82, Walton and Weybridge 10 per cent. 14⅜, 14½. On Wednesday, British 35⅜, Gas Light ordinary 78, 78¼, 78⅜, 78½, 78¾, ditto maximum 60½, 61, ditto debenture 59¾, Imperial Continental 78, Primitiva 36s. 3d., South Metropolitan 82, 82½. On Thursday, European 12¾, 12⅞, Gas Light ordinary 78¼, 79, Imperial Continental 78, 78¼, 78½, 78⅜, 79¼, 79½, 80, 81, 82, Primitiva preference 74s., 74s. 6d., 75s., South Metropolitan 82½, 82⅜. On Friday, Gas Light ordinary 78¼, 79, 79¼, 79½, ditto maximum 61½, Imperial Continental 81, 85, ditto debenture 65, Oriental 108½, 109, Primitiva 37s. 3d., 38s., ditto preference 63s. 9d., 64s. 3d., 64s. 6d., 64s. 9d., 65s. The Stock Exchange was closed on Saturday.

The Bank rate is 5 per cent.—as fixed on Aug. 8, 1914.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.				£ s. d.	
1,551,868	Stk.	April 8	2½	5⅛	Alliance & Dublin Ord.	59—64	8 16 2	..
374,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—79	5 1 8	..
280,000	5	April 29	7½	3/-	Bombay, Ltd.	5⅞—6⅜	5 17 8	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c. / B ¶ p.c. / Pref. 5 p.c. / 4 p.c. Deb.	26—30	6 6 8	..
333,110	10	,,	¶	7/-		15—15½	4 10 4	..
115,000	10	,,	6	6/-		13¾—14	4 5 9	..
159,740	—	—	—	4		—	—	..
992,045	Stk.	Feb. 26	†14	56/-	Brentford A Consold.	361—366	5 5 8	..
734,920	,,	,,	†11	55/-	Do. B New	304—309	5 5 8	..
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
231,400	,,	June 11	4	4	Do. 4 p.c. Deb.	91—93	4 6 0	..
217,380	Stk.	Feb. 26	11	10⅜	Brighton & Hove Orig.	308—318	5 8 4	..
344,200	,,	,,	8	7⅜	Do. A Ord. Stk.	154—159	5 0 8	..
580,000	20	Mar. 26	19½	22/6	British	44—45	5 11 1	35⅜
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
245,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	62—62½
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1⅛—2⅛	—	..
100,000	10	—	—	4/6	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
157,150	Stk.	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	4 10 11	..
1,513,280	Stk.	Feb. 12	5,9/4	49/4	Commercial 4 p.c. Stk.	106—108	5 1 2	..
560,000	,,	,,	5½	46/8	Do. 3½ p.c. do.	103—105	5 1 6	..
475,000	,,	June 11	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	4 8 11	..
800 000	Stk.	,,	4	—	Continental Union, Ltd.	76—79	5 1 8	..
200 000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	5 18 8	..
278,400	,,	,,	—	11½	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	5½	Derby Con. Stk.	123—125	4 16 0	..
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	3 16 11	..
1,002,180	10	July 29	10	10/-	European, Ltd.	17½—18	5 11 1	12⅜—12⅞
16,327,185	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds	98—102	4 15 6	78—79⅛
2,600,000	,,	,,	3½	3½		76—79	4 8 7	60⅛—61¼
4,062,235	,,	,,	4	4		96—99	4 0 10	75⅝—76
4,674,850	,,	June 11	3	3		72½—74½	4 0 6	59¼—60½
130,000	,,	,,	10	10		..	—	..
258,740	Stk.	Mar. 12	5	4½	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16½—16⅞	6 11 4	..
86,600	—	—	—	9½	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7¼	7¼	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅜	5⅞	Do. B	115—119	5 8 0	..
65,500	,,	June 26	4	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	4½	Imperial Continental	150—160	5 12 6	76½—85
1,235,000	Stk.	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	..
235,242	Stk.	Mar. 12	6⅜	6⅜	Lea Bridge Ord. 5 p.c.	119—121	5 7 5	..
2,498,905	Stk.	Feb. 26	10	5	Liverpool 5 p.c. Ord. { A / B	211—213	4 13 11	..
						146—148	4 14 7	..
306,083	,,	June 26	4	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	6 9 9	..
250,000	100	April 1	4½	4½	Met. of Melbourne { 4½ p.c. Deb.	99—101	4 9 1	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	6 13 4	..
1,876,892	Stk.	July 29	4½	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	..
529,705	Stk.	June 26	3½	3½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	7/8/8	North Middlesex 7 p.c.	14—15	5 2 8	..
300,000	Stk.	May 14	8	8	Oriental, Ltd.	117—122	6 11 2	108½—109
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅜	6 9 0	..
60,000	50	Feb. 26	13	65/-	Portsea, Island B	128—131	4 19 3	..
100,000	50	,,	12	60/-	Do. C	118—121	4 19 2	..
52,000	50	,,	10	—	Do. D	..	—	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	6 18 4	36/3—39/4½
499,960	5	June 26	5	2/6	,, 5 p.c. Pref.	4⅞—5	5 0 0	63/9—65/-
521,600	100	June 2	4	4	,, 4 p.c. Deb.	91—93	4 6 0	..
—	—	—	—	4	,, ,, ,, 1911	..	—	..
346,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. / 5 p.c. Deb.	10½—11	5 9 1	..
125,000	50	July 1	5	5		47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	10	Sheffield A	223—224	4 9 8	..
209,984	,,	,,	10	10	Do. B	222—224	4 9 8	..
523,500	,,	,,	10	10	Do. C	220—222	4 10 1	184
90,000	10	May 28	9	6/-	South African	10½—11½	7 16 6	..
6,609,895	Stk.	Feb. 10	5/4/0	44/-	South Met., 4 p.c. Ord.	111—113	4 16 8	82—82⅞
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	72½—74½	4 0 6	..
224,820	Stk.	Feb. 26	8½	8	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	5 8 5	..
60,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—112	4 9 8	..
135,000	—	—	—	48/4	Do. West Kent.	..	—	..
187,558	,,	June 26	5	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	..
647,740	Stk.	May 14	5	5	Southampton Ord.	99—102	4 18 0	..
120,000	Stk.	Feb. 12	7½	7½	Tottenham and District { A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.	135—138	5 8 8	..
782,275	,,	,,	6	6		115—117	5 2 7	..
181,255	,,	June 26	4	4		87—89	4 9 11	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	8 6 8	..
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	93—95	5 5 8	..
286,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	103½—109½	4 11 4	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	Stk.	Feb. 26	8⅜	78/9	Wandsworth A 5 p.c.	151—156	5 7 4	..
265,636	,,	,,	6⅞	63/9	,, B 3½ p.c.	129—134	5 2 7	..
108,075	,,	,,	5/17/8	55/1½	,, C 3½ p.c.	110—115	5 2 0	..
852,000	,,	,,	6½	57/6	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6⅜	63/9	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

† Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

Price of Gas at Hornsey.—The announcement is made by the Hornsey Gas Company that, in view of the increased cost of materials, the price of gas will shortly be advanced from 2s. 11d. to 3s. 1d. per 1000 cubic feet.

Shipley Gas-Works Results.—A revenue statement by the Shipley Gas Engineer (Mr. Harry Blakey) shows that during the year ended March 31 the income from the sale of gas was £28,278, as compared with £26,857 in the previous year; and from residuals and spent oxide, £8980, as compared with £7574. The coal carbonized was only 15,677 tons, as against 17,544 tons; but the cost was £12,217, as against £12,055. There was a reduction on wages account of £300; and there had been considerable economies in repairs and renewals and special charges. There was an actual profit on the year's working of £238, as against a loss in the previous year of £1716. The gas sold during the year was 163,675,342 cubic feet, as against 175,756,130 feet. The consumption for power purposes was 13,000,000 cubic feet. The profit, while giving rise to satisfaction, was attributed entirely to the residual products.

After full consideration on a demand by the Gas Workers and General Labourers' Union, the Leeds General Purposes Committee have recommended the City Council not to make any alteration in the rate of pay to the Corporation employees.

The Gosport and Alverstoke Electric Light Supply Company have issued a notice to their customers, stating that—owing to the impossibility of retaining the services of trained men, and the practical impossibility, under the present circumstances, of replacing them—it is feared it may be necessary in the near future to restrict, if not entirely cancel, the supply of electricity for power, heating, lighting, and the service of tramcars. The restriction will, however, only be brought about if the labour difficulty makes it impossible to supply current.

An increase of officials' salaries all round by the Todmorden Town Council, decided upon last week, includes an advance of £50 per annum to Mr. F. V. Barnes, the Gas Manager. Corporation employees of all departments have been granted a weekly war bonus of 1s. 6d.

The Shipley District Council, at their recent meeting, warmly complimented the Gas Engineer (Mr. Harry Blakey) upon his report of the points raised at the gas engineers' meeting in London, and which were likely to prove advantageous in the future in the production and distribution of gas.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for June 28.]

Nos. 8594—8935.

Anderson, C. L.—"Universal joints." No. 8879.
Fabry, R.—"Manufacture of concentrated ammoniacal liquor." No. 8897.
Faust, L.—See Anderson. No. 8879.
Ionides, A. C.—"Gaseous combustion." No. 8741.
Jacks, T.—"Gasholders." No. 8903.
Keith, G. & J.—"Crucible furnaces." No. 8793.
Livesey, R. C.—"Boring, tapping, and ending machines." No. 8718.
Ogilvy, W. N.—"Water-valves and stopcocks." No. 8628.
Savile, J. S.—"Pipe-joints." No. 8667.
Smith, E. R. & W. R.—See Ogilvy. No. 8628.
Swenson, C. E.—See Anderson. No. 8879.
Wilson, W. A.—"Gas-fires." No. 8886.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Retort Setters and Bricklayers. Gravesend Gas-Works.

Well-Educated Youths. Box 660, care of R. F. White and Son, Fleet Street, E.C.

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Sale of Shares.

Grays and Tilbury Gas Company. Tenders to A. & W. Richards by July 6.

TENDERS FOR

Coal.

Haverfordwest Corporation. Tenders by July 17.
Haverhill Urban District Council. Tenders by July 11.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

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No Form of Tender is provided nor will be supplied.
The Council reserve the right to divide the Contract as they think fit, and do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "GAS," to be Delivered to me on or before the 11th of July, 1916.

JAMES BEASLEY,
Clerk.

Haverhill, Suffolk,
June 21, 1916.

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Forms of Tender and further Particulars of

R. T. P. WILLIAMS,
Town Clerk.

Haverfordwest, June 29, 1916.

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MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at THE MART, TOKENHOUSE YARD, E.C.
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PATENTS.—Handbook of Patent Law, by W. P. THOMPSON, F.C.S., M.I.Mech.E., C.P.A., International Patent Agent, 6, Lord Street, Liverpool, and Bradford and London. 16th Edition 1915, 242 pages. 2s. 6d. Post free. English Portion, 6d. "A useful guide to inventors. The subject is treated in a simple and concise manner."—JOURNAL OF GAS LIGHTING.

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